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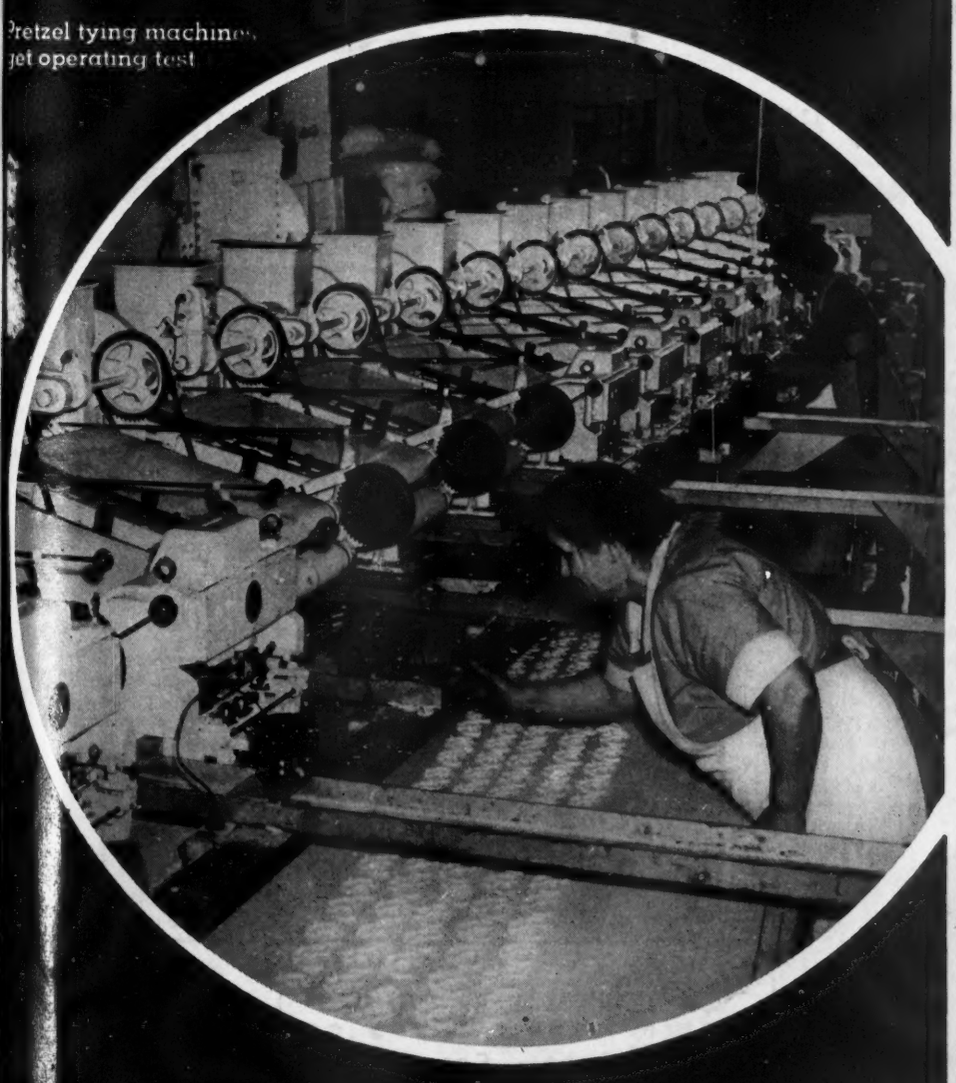
ST ENGINEERING

FOOD INDUSTRIES

NATIONAL EDITION

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



Pretzel tying machines get operating test

FEBRUARY 1948

Brewery Filtration vs. Centrifuging

New Co-op Poultry Processing Plant

Infra-Red Toasting Of Wheat Germ

Hot House Food Raised by the Ton

Using Quaternaries In the Dairy Plant

Smoke Washing Unit Improves Meats

The Plant Foreman And Enzyme Action

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FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

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THE COVER

SIXTEEN new pretzel twisting or tying machines replace older, slower twisters in a pilot installation at Halter's Pretzels, Inc., Canton, O. The machines were produced by American Machine & Foundry Co. Each will turn out 60 perfect, unmarked pretzels per minute. For additional pictures on pretzel making see page 121.

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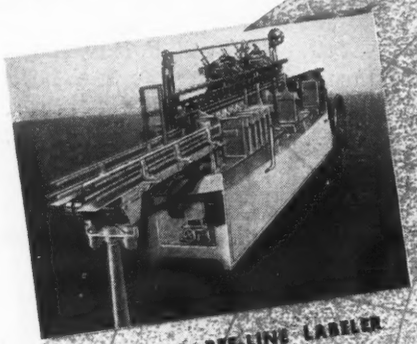

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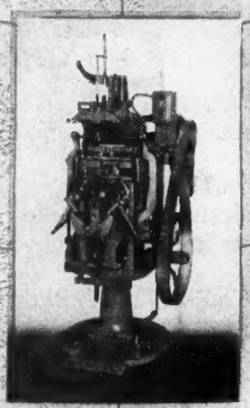
— for high quality, high precision, automatic application of front labels, front and back labels, and neck labels if desired, to round, square, oval, flat or panel glass containers. There is a Model 65 BEE-LINE, a Model 120 BEE-LINE with twin labeling stations for high production at the most efficient labeling speed and a BEE-LINE for handling gallon and half-gallon jugs and bottles as well as the smaller sizes



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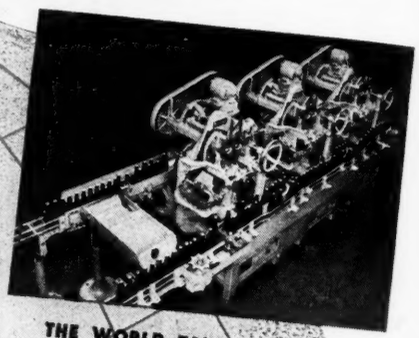

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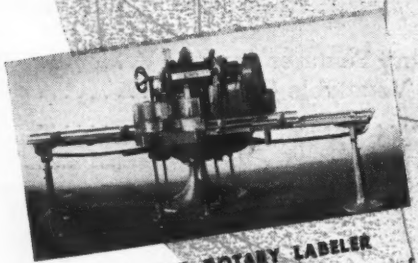

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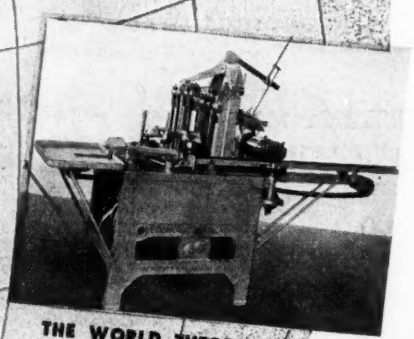

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(466)

Food Costs Challenge Industry

THE rising index of food prices, estimated to have advanced more than 40 percent from the middle of 1946 to near the end of 1947, forecasts an imperative need to bring food costs down.

The impact of the nearly intolerable cost of foods on the average family is far-reaching. Its results have been felt throughout industrial America, and labor's potential reaction may well be to predicate and foment 1948 labor strife on the basis of high food costs for workers' families. So food prices now have become a problem of national industrial welfare. Some large corporations, formerly interested in the food industry only as a market for their products are even now investigating the industry's machine and equipment needs in an effort to be of some assistance in developing cost-saving machines.

Wages throughout the food industry show the astounding average increase of 91 percent from 1939 up to 1947. But productivity of workers for the period 1945-46 (USBLS) indicates that, with one exception, increases averaged only from 1 to 9 percent.

The pressure developed by this inequitable relationship between labor costs and worker production makes it necessary that means be devised to reduce processing costs by streamlining and mechanizing plants. And, while the industry has always recognized the fundamental soundness of keeping plants and processes modern, it must now aggressively promote new means for perfecting the mechanical abilities of materials handling and processing lines.

New Machines—New Processes

Progress in this direction is advancing with some notable strides. Some processes, machines, equipment and materials have shown great improvement. A few of the most outstanding of these provide economies, efficiencies, better sanitary conditions and a new uniformity of product believed unattainable a few short years ago. And, where the manufacture of some foods was formerly an art—and was taught, as of old, on an apprenticeship basis, it has now become a science where the food is produced with machines and far less labor.

Examples of such progress indicate that a higher degree of mechanical efficiency exists for most food processes. A continuous mechanical process for the manufacture of macaroni produces 3,000 lb. per hour, while it requires 3 men to operate a batch process and produce around 1,000 lb. per hour. A new rice process actually improves the quality of the original raw product and, at the same time, delivers a yield of fancy head rice 25 percent greater than that secured by the conventional milling process. A new mechanical filleter with a crew of 9 operators produces 4,583 lb. of haddock fillets per hour or 509 lb. per man, as compared to the old method in which each manual filleter produced only 210 lb. per hour. New machines and processes have been continually appearing on the food processing scene, but much more must be done in this direction. The need to mechanize is now more urgent than ever before. Every food preservation process must be studied with this purpose in mind.

An American Industrial Problem

In the past, this trend to streamline food plants originated mainly from the profit impulse and was largely confined to factories operated by progressive management. Now the need to reduce food costs is an American industrial problem—not solely one of profit making. And in attaining its present high momentum, the trend begins to impose competitive pressures on all food manufactures. Whenever, through the use of machines and equipment, a new means is developed to process certain foods and produce as good or better quality product at lower costs, most manufacturers of these foods will want this equipment. The appearance of this lower cost, better quality product on retail markets will set up competitive influences with other foods. This will result in an entirely new set of pressures to streamline other processes so as to reduce costs and improve the quality of products.

Labor resists the installation of labor-saving machines, yet high labor costs are one of the major and direct causes of this industrial move to mechanize food plants. While the food industry is the largest segment of industrial America, it still operates on one of the smallest profit margins. Lower food prices cannot be absorbed only in current manufacturing profits. But it is imperative for the good of the nation, as well as for that of all domestic industry, that food costs be lowered. Modernization and mechanization, guided by new technics, will make great strides toward this end.

C. R. Haughhurst

ASSOCIATE EDITOR

The Talk of the Industry

• IT wasn't so many years ago when the price cutter and chiseler were anathema to business in general. The effect was a spate of resale price maintenance laws.

Today we have a vastly different situation though the price cutter is still with us. But he operates differently now; he refuses to advance his prices along with the rest of the trade.

• FOOD technologists must get acquainted with nematodes. These are the tiny parasites which cause heavy crop losses by attack on the roots of plants. We wonder where this business of food technology will take us next!

• A DOZEN eggs weighs a third of a pound when dried, and one and a quarter pounds when frozen. But an unsold dozen eggs weighs more heavily than that on the market.

• BUYING and selling grain as a speculation has been bitterly criticized by President Truman. Unquestionably it has been a factor affecting the price of grain *at times*. But it is doubtful whether the practice is anything like as wicked as the President and his administrative assistants would like to make it appear. Obviously they would like a smoke screen to hide the inflationary effect of buying in huge quantities for foreign relief.

Future buying by grain processors as a hedge against price change is very different from speculative purchasing. Even high official Washington recognizes this. Thus there appears no tendency to criticize the food processing industry for its part in the future markets. This at least is a bit of comfort for the long-time legitimate future operators of our industries. Seldom is Washington so intelligently discriminating.

• FACTORY managers have long known that an important element in cost of manufactured goods is the productivity of the worker. The man hours of factory labor per ton make or break the profit of enterprise. Only lately have the labor leaders and official Washington begun to recognize this basic fact. It is very encouraging that there is now a beginning of deserved recognition, for without more emphasis on productivity we cannot hope for technologic progress. Only by higher productivity can labor expect, and get, higher hourly wage rates.

The proper objectives of management and labor *are* one. By the millennium, they will be fully recognized as such.

• YEARS ago, when California fruit canners found that the mid-summer varieties of cling peaches had characteristics that made it the most preferable variety for canning, they interested growers to put in acres of this kind of fruit.

The plantings were made over a period of several years and soon the trees began to bear. In early days the crop was harvested for canneries during a period of 7 to 8 weeks or longer. And the canneries were able to receive and process the crop without undue problems. But as the trees matured and came into full bearing, the harvest time became chronologically shorter and shorter. This is not surprising—it's a natural sequence with bearing trees. Yet as the season has grown progressively shorter, the canning, freezing and drying industry that processes this crop has found each year a more difficult one.

During the extra good growing seasons this crop becomes the California canners' Frankenstein. Tons and tons of peaches—a veritable avalanche of fruit—comes pouring into the processors' factories as the harvest season reaches its peak. And only because the industry kept ahead of raw production with new equipment, machines and technics can it now process this enormous crop each season.

• VICTORY gardens and home canning will be needed for another year. Food technologists can well support both programs. Neither will overload any major market to the detriment of the commercially processed fruits and vegetables that compete. Export and relief demands appear certain to absorb the full production of almost every line of goods with which this home effort might compete. Incidentally, one cynic said recently, "The more they dig in the garden, the hungrier they are, and then the more factory prepared food they will eat."

Hors d'Oeuvres

• *Business Week* reports a conclusion reached at a conference at the Naval Gun Factory: "It's virtually impossible to damage an oyster by an underwater explosion." We recall now that at no time did the oysters appear to be worried about atomic developments.

• *Many a fishy eye is being cast upon Prof. Stewart L. Tuckey's achievement in deodorizing Limburger cheese. What's to become of the air of distinction always worn by Limburger eaters?*

• USDA has set consumer standards for Irish potatoes, the first such standard in the fresh fruit and vegetable field. Sure, n' they've been tryin' t'make the Irish conform to a standard fer a 1,000 years and a lotta good it's done thim.

• *But USDA isn't confining its efforts to standards. They have also issued data on the "invisible" supplies of sugar in the U. S. on September* 30. *Anybody can search for a comet.*

• The Associated Press quotes Donald Nelson as saying he is going to revolutionize the food industry with an electro-chemical process that "will do for food what freezing now does—only it will do it without freezing." So except for its branches in fruit and vegetable canning and dehydrating, meat packing, milk and dairy products, baking, confectionery, cereals, beverages, pickles and preserves, the food industry is threatened with revolution.

• *Tradition or no tradition, the Food and Drug Administration couldn't find any plums in English Plum Pudding, so they ordered the label out. They may call it Christmas Pudding and presumably if you're good you'll get what you want.*

• We should be talking about Plum Pudding with all the February cherry pie staring us in the face.

• *The Walter Baker Co., now a division of General Foods, has been operating at the same location up in Dorchester, Mass., since* 1780. *In short, the company isn't one of these fly-by-century concerns.*

• The Eastern Regional Research Lab has come up with a sugar product called allyl sucrose. It's fine as a finish for furniture, wall coverings and woodwork, they say. It'll be handy, too, in case you get hungry in the middle of the night.

J.A.J.J.

A set of enzymes, like stepping stones, may be needed for plant or animal processes. If one fails, intermediates may pile up.

What A Foreman Should Know About Enzyme Action

How to preserve food is usually a question of how to stop the action of enzymes capable of causing decay and decomposition. Processor is in a good position to supply the enzyme chemist with valuable data

By A. K. BALLS, Enzyme Research Laboratory, Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration, USDA, Albany, California

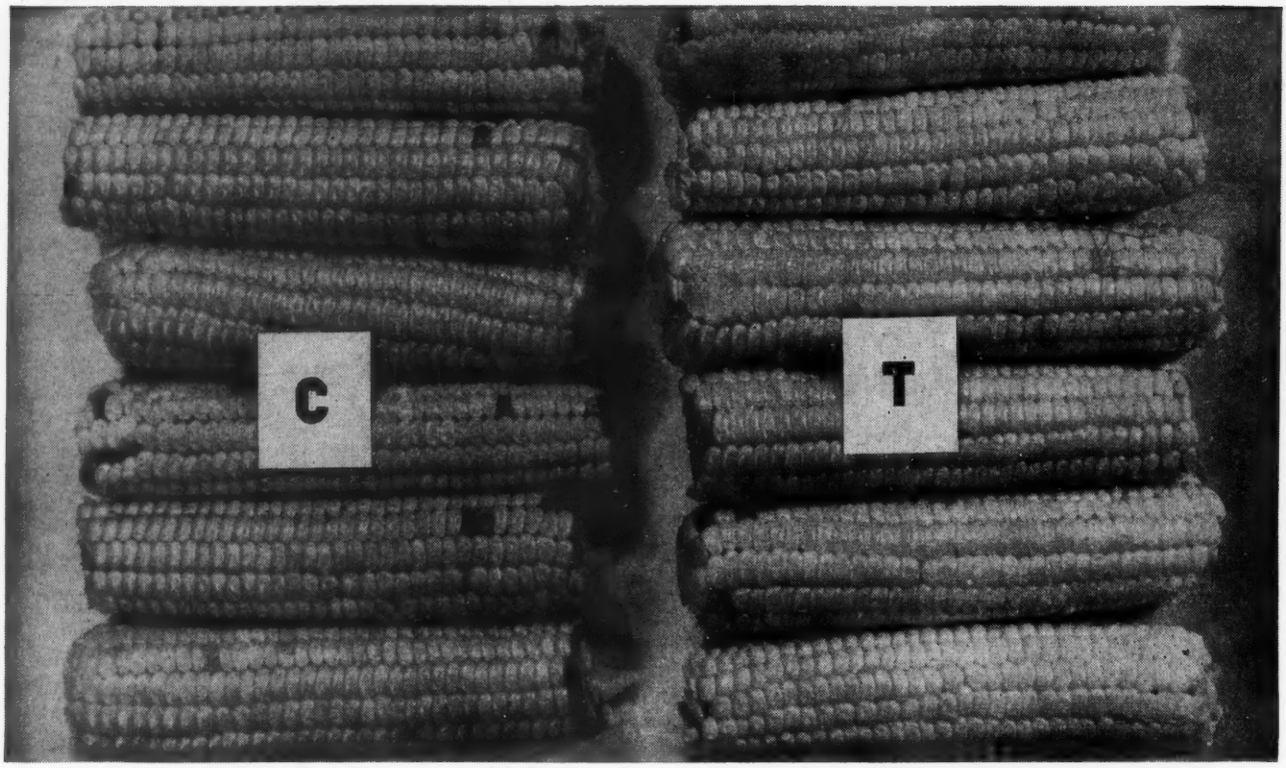
PRACTICAL men in the plant would have a higher regard for enzyme research than they usually do, if they knew more about it. There is no need to explain the special methods of investigation that the enzyme chemist uses, but it is to the advantage of everyone in food processing to understand the enzymologist's objectives.

The food processor, whether he knows it or not, is using some of the results of enzyme research every day. He may "blanch" his raw material, for example. In doing so he is attempting to get rid of certain things which, if not destroyed, will later cause the product to lose quality.

Often the food man is concerned about the quality of the raw material he receives in the plant. He knows that you can't explain a green persimmon to a consumer, not even with mirrors and vitamins. What he may not realize is that maturity, ripeness and even decay are the outward symptoms of chemical changes caused by certain substances in the fruit or vegetable. These substances—or enzymes—cause it to grow, to mature, to ripen, and later to decay. Taken together, these substances do a great many things, but there is a great number and variety of them—probably a separate one for each step in every chemical reaction that goes on. How do we know all this? Because in quite a few cases it has been possible to isolate these active substances from fruits, vegetables, or other plant or animal materials. After separation, the enzymes can still perform their functions in a test tube or laboratory flask.

The term enzyme comes from a Greek word that means "in yeast." Yeast is alive. When people found that *dead* yeast could still cause alcoholic fermentation, they were hard put to it to explain how. There was something in yeast which, although not alive, could do stranger things than any chemist had ever done in the laboratory. It could make alcohol out of sugar. This something was called "enzyme" and was first studied perhaps 50 years ago. To summarize, it has been found that living things (and only living things) produce substances which cause chemical reactions to go on which otherwise would require temperatures near red heat

(*Continued on page* 222)



ACID-TREATMENT is less effective when it precedes rather than follows precooling (12-15 min. under cold water sprays). Control, untreated, (C) and acid-treated (T) boiled ears of corn, prepared by a commercial operator. Packaged corn was held 4 days at 45 deg. F.

Prevention of Darkening

Delayed-action browning of injured kernels of husked, trimmed fresh

By HUGH G. GAUCH and LELAND E. SCOTT
Maryland Agricultural Experiment Station, College Park, Md.

CONSUMER packaging of husked, trimmed fresh sweet corn, a recent innovation, has been hindered because kernels injured in the husking process darken when boiled after a short storage period. A solution to this "delayed-action browning" has been found by immersing ears of corn in an acid-water bath before packaging.

Darkening of injured kernels of fresh sweet corn occurs under different conditions from those which induce browning in many fruits and vegetables. While injured corn kernels darken only during cooking, cut surfaces of fresh fruits and vegetables such as apples, Irish potatoes, peaches, apricots and bananas darken within a few minutes at room temperature. Furthermore, darkening of corn kernels takes place only when there has been an appreciable lapse of time (two to three days) following injury.

Darkening of injured kernels of corn is also influenced by the temperature at which the corn is stored. For example, browning is not likely to occur within seven days or less when corn is stored at 32 deg. F. On the other hand, browning does take place within two days at 60 deg. F. or three days at 38 or 45 deg. F.

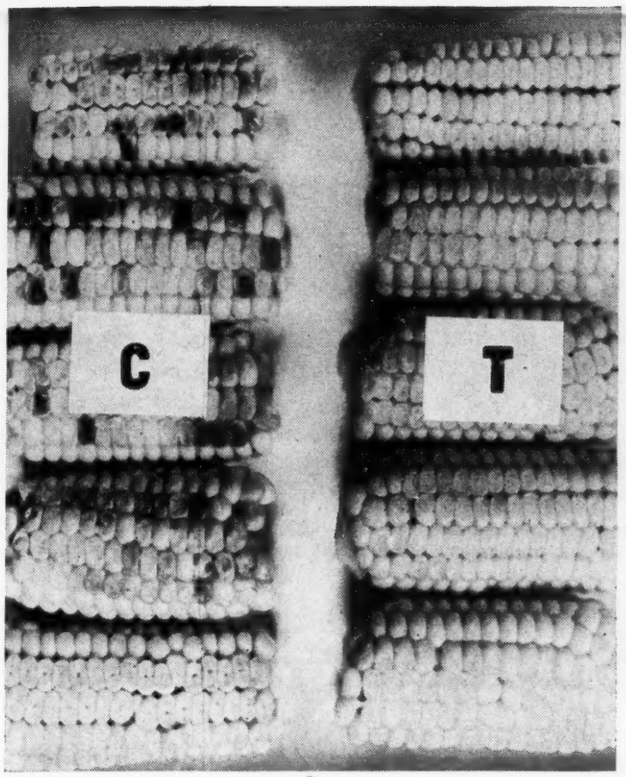
The most insidious feature of fresh, packaged corn darkening is the lack of any detectable evidence, before cooking, that the kernels are going to turn brown.

Discoloration of sweet corn has not been a problem in the past because: (1) If the corn is canned, it is processed within a short time after removal (injury) from the cob, (2) if it is sold fresh, it remains uninjured in the husk and (3) if it is frozen, all enzyme action is stopped by the blanching operation.

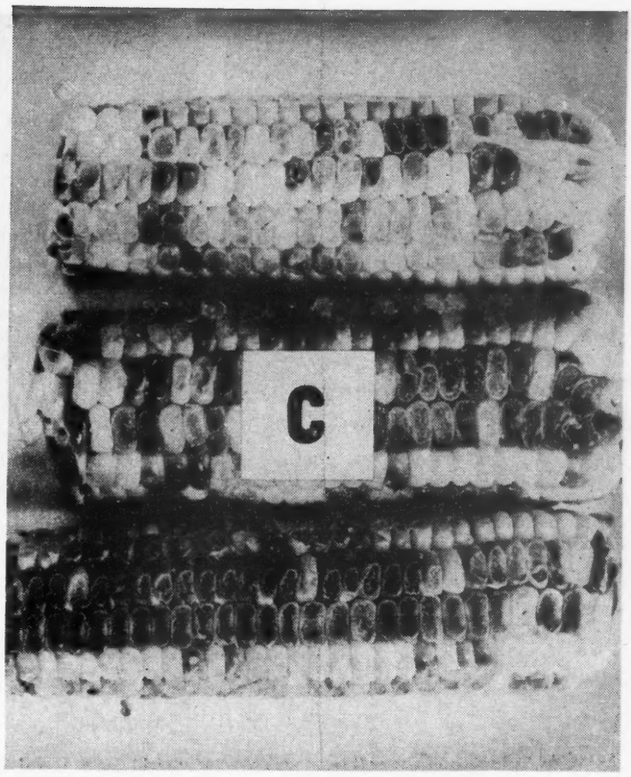
Kernel injury and subsequent darkening are attributed to injuries sustained by kernels by the husking machine and trimming. If the husked and trimmed corn is then packaged and held for two or three days at 45 to 60 deg. F., all or most of the injured kernels will discolor after cooking. In extreme cases, the ear of corn will take on an unsightly appearance. The degree of darkening varies in different kernels. They may turn light pink, tan, brown, or purplish black.

Different lots of corn vary in the storage time necessary to induce browning and the intensity of browning. To date, however, tests have not been made on either white corn varieties or known varieties of corn of known planting dates. Tests are now in progress to investigate these variables.

No attempt has been made to determine the extent of browning in consumer-packaged corn on the market or its occurrence by questioning purchasers. On various occasions, however, packaged corn has been picked up in local markets and frequently found to show browning of injured kernels when



DELAYED BROWNING of corn is prevented by acid-treatment. Injured kernels discolor in control (C) and not in treated (T) ears.



INJURED KERNELS darken, while uninjured kernels do not. Darkening is not detected before, but after boiling the ears of corn.

In Consumer-Packaged Corn*

corn is prevented by immersing ears in acid-water before packaging

prepared for table use in the customary manner.

Although browning is not detectable prior to cooking, the problem is serious and will ultimately reduce sales for this commodity.

Within the past year extensive studies have been in progress in an attempt to explain the fundamental nature of delayed browning, and to develop a commercially applicable means of control. A method for alleviating or preventing the occurrence of browning will be discussed in this report. Physiological aspects of the problem will, however, be reported elsewhere at a later date.

Packaging Not the Solution

Early in the investigation it was found that browning of injured kernels did not occur during boiling when ears of corn had been stored in a sealed Cellophane bag or when a completely sealed package was used. Control of discoloration by sealed enclosures is not advisable because fresh corn develops off-flavors in a non-ventilated package due to anaerobic respiration.

Acid-Water Treatment

Later in the investigation it was found that browning was prevented by immersing ears with injured kernels in acidulated water. Artificial injury was produced in the test by "de-capping" the kernels with an ordinary peeler used by housewives for peeling vegetables. Ears were then immersed for varying lengths of time in different acids of varying concentrations.

The following procedure provided the best results, and it can be easily adapted to normal operation:

1. Husk, trim and precool the ear of corn in cold water sprays.
2. Immerse the corn for four to six minutes in an acid-water bath containing 1.1 qt. of concentrated sulfuric acid per 100 gal. of water.
3. Rinse momentarily with running tap water to remove the acid solution and then package.

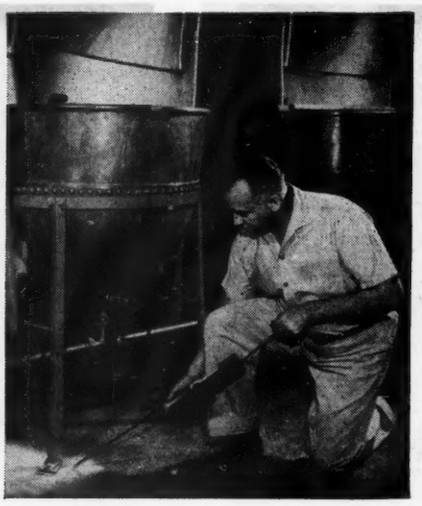
It should be pointed out, however, that acid-water treatment will not prevent the browning of injured kernels after long standing. The treatment will only be effective following recent injury, produced by the husking machine and trimming operations within an hour or so before treatment.

Prolonged rinsing following the treatment decreases its effectiveness. When, for example, acid-treated ears were sprayed for 12 to 15 minutes with cold water and packaged by a commercial operator, some browning took place after the ears were boiled. A momentary rinse was found to be sufficient to remove surface acids without affecting the efficiency of the treatment.

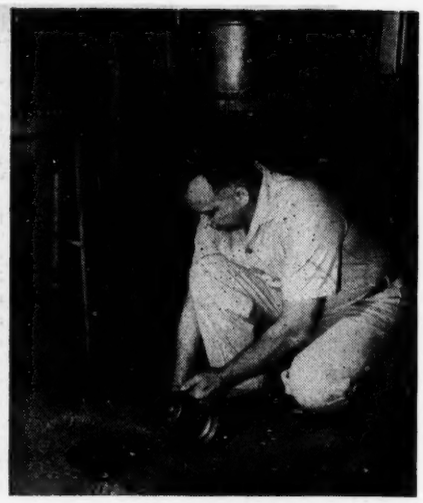
When acid-treated corn is prepared for table use in the usual manner, no adverse changes are detected in the quality of the corn. Little, if any, acid penetrates into the kernels. The quantity of acid in the kernels is so small that it cannot be detected either by taste or a pH reading of the water in which the ears are boiled.

*Miscellaneous Publication No. 58, contribution No. 2075 of the Maryland Agricultural Experiment Station (Depts. of Botany and Horticulture).

FINE STREAM applicator for applying Chlordane solution into cracks and crevices.



HAND DUSTER for applying Chlordane powder. Flat tip controls the application.



LIQUID Chlordane is applied to drains, where the insect pests are likely to breed.

Chlordane Is Superior To DDT

Greater potency permits use of lower concentrations of toxicant. Chlordane

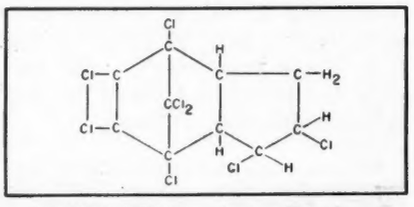
FOOD INDUSTRIES Staff Report

CHLORDANE, a new chemical insecticide developed by American research since the end of the war, is superior to DDT and other new toxicants for controlling the common insect pests found in food plants. It is at least seven times as lethal as DDT for flies; five times as lethal as DDT for the German cockroach, one of the most common pests in food plants; four times as potent against the American cockroach and three times as potent against the confused flour beetle and the silverfish. In addition, it has shown superior effectiveness against the Oriental cockroach, firebrat, Pharaoh's ant, crazy ant, pavement ant, citronella ant, thief ant, harvester ant, cornfield ant, carpenter ant, Argentine ant, yellow meal worm, rice weevil, granary weevil, fruit fly, hide beetle, larder beetle and bean weevil. It is also effective against household pests such as spiders and centipedes, which cannot be controlled with DDT.

Advantages of Chlordane

Although more expensive than DDT, the superior results with this chemical, especially its effectiveness against cockroaches, ants and other vermin for which DDT is not outstandingly effective, make it probable that it will replace DDT in food plants. Its greater potency makes possible effective control of insect vermin with lower concentrations of toxicant than could be used heretofore. This minimizes the possibility of food contamination. The greater toxicity of Chlordane to insects also makes possible effective sprays less toxic to warm-blooded animals than DDT sprays.

CHLORDANE for 2½ gal. of two percent spray. Sufficient for 2,040 sq. ft. of area.



STRUCTURAL formula for Chlordane.

It can be emulsified directly in water, so that sprays containing a very low percentage of oily material may be used. (As little as 0.25 percent of Chlordane in water can be used as an effective fly spray.) This eliminates the fire hazard present where DDT oil sprays and DDT-xylene-water emulsions are used. It is nearly odorless, non-staining and practically invisible on treated surfaces. These are important considerations in food plants.

While this insect toxicant has been on the market for about two years, its distribution has been so limited that few persons aside from commercial exterminators have had first-hand experience with it. Pest control operators have found it so effective against cockroaches and other common factory infesting insects that some have gone so far as to predict that it will put them out of business. This, however, is an extremely optimistic view. No insecticide can make up for shortcomings in plant sanitation and poor housekeeping practices which favor insect breeding. The major emphasis in keeping a food plant insect-free should be placed on preventing their growth by minimizing their food supply and hiding and breeding places.

Chlordane has properties which make it an extremely effective insecticide. It is effective in killing many different kinds of insects. It

PRESSURE SPRAYER (5-gal.) with a special nozzle that delivers a fan-shaped, coarse spray. The sprayer is adapted for treating large areas such as walls and ceilings.

INACCESSIBLE areas are easier to reach with hand duster than liquid sprayers.

For Controlling Insect Pests

is less toxic to warm-blooded animals than equally effective DDT preparations

is lethal to insects in minute amounts and it maintains almost the maximum rate of kill and retains its potency for a long time. Experiments to determine how long it will remain potent have not yet been completed. Thus far, in many situations it has remained lethal to cockroaches for more than six months.

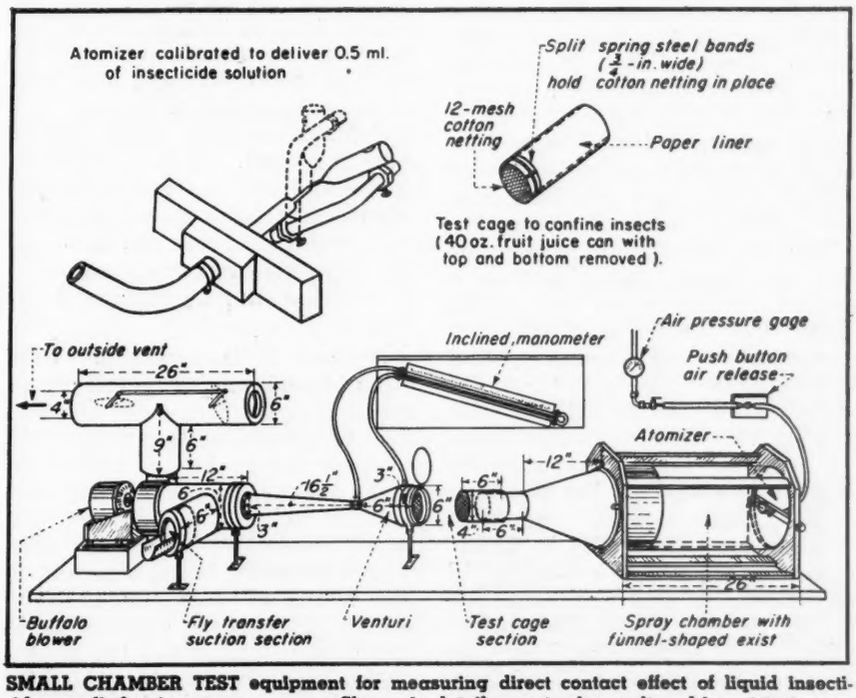
Physical and Chemical Properties

Chlordane is a chlorinated hydrocarbon insect toxicant with the empirical formula $C_{10}H_6Cl_8$. It was discovered by Dr. Julius Hyman early in 1945. Its chemical name is 1,2,4,5,6,7,8,8 — octachloro — 4,7— methano—3a,4,7,7a—tetrahydroindane. The refined product, which contains 60 to 75 percent of Chlordane and 25 to 40 percent of related compounds, all toxic to insects, is a viscous oily liquid, nearly odorless, which boils at 175 deg. C. at 2 mm. pressure.

The name Chlordane was approved for this compound by the U. S. Department of Agriculture. Unlike DDT, it is completely soluble in deodorized kerosene and in the usual organic solvents. It is not soluble in water, but may be emulsified in water with the addition of a suitable emulsifying agent.

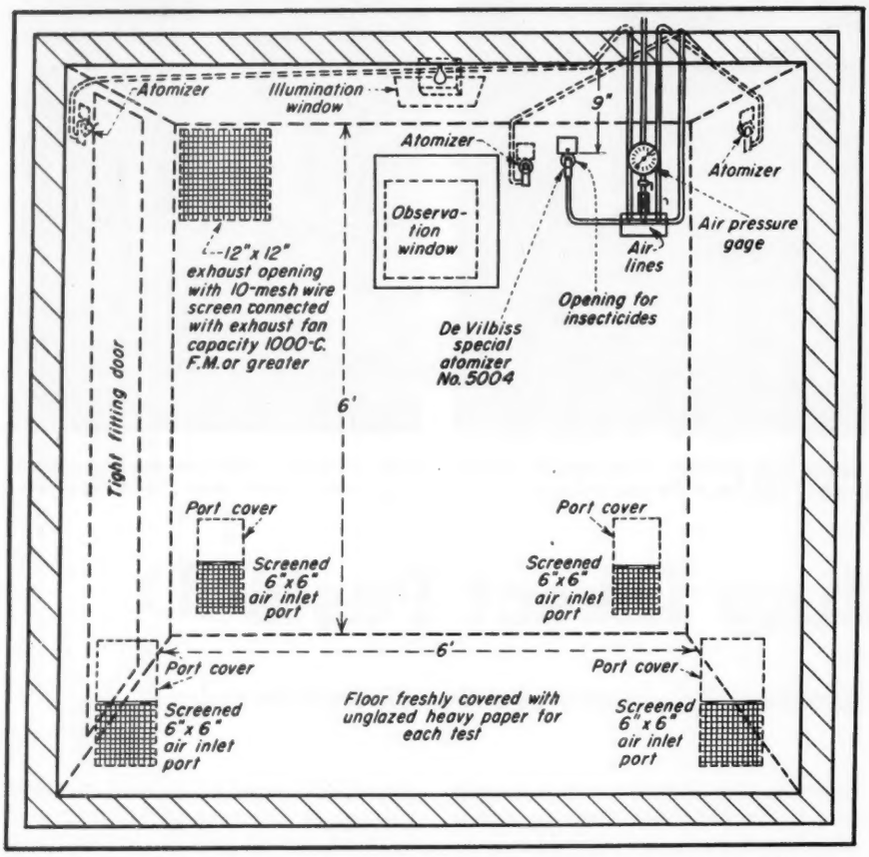
In common with other chlorinated insecticides such as DDT it reacts in the presence of alkaline substances and loses much of its toxicity. For this reason it should not be mixed with lime or other alkaline materials. (Chlordane residues on concrete surfaces are, however, considerably more stable than are residues of other new synthetics such as DDT, toxaphene, and benzenehexachloride.) Chlordane is a dense liquid (sp. gr. 1.61) weighing 13.5 lb. per gal. It volatilizes slowly so that, to some degree, it is a local fumigant. A film lethal to insects will remain for a month or longer on indoor surfaces treated at the rate of 100 mg. per sq. ft. A film of this thickness is not visible on most surfaces.

While it can be used as an oil solution, wettable powder, or dust, it is probable that the most advantageous form for food establishments is the aqueous emulsion either with or without additional solvent. It is available in two grades, refined and agricultural. They are equally effective, but the


Atomizer calibrated to deliver 0.5 ml. of insecticide solution
Split spring steel bands (¾-in. wide) hold cotton netting in place
12-mesh cotton netting
Paper liner
Test cage to confine insects (40 oz. fruit juice can with top and bottom removed).
To outside vent
Inclined manometer
Air pressure gage
Push button air release
Atomizer
Buffalo blower
Fly transfer suction section
Venturi
Test cage section
Spray chamber with funnel-shaped exist

SMALL CHAMBER TEST equipment for measuring direct contact effect of liquid insecticides applied to insects as a spray. Shown in detail are atomizer unit and insect test cage.

Liquid Insecticide Effectiveness Is Determined With Test Chamber


Atomizer
Illumination window
9"
Atomizer
Atomizer
Observation window
Air pressure gage
Air lines
12" x 12" exhaust opening with 10-mesh wire screen connected with exhaust fan capacity 1000 C.F.M. or greater
Opening for insecticides
De Vilbiss special atomizer No. 5004
Tight fitting door
6'
Port cover
Screened 6" x 6" air inlet port
Port cover
Screened 6" x 6" air inlet port
6'
Port cover
Port cover
Screened 6" x 6" air inlet port
Floor freshly covered with unglazed heavy paper for each test
Screened 6" x 6" air inlet port

PEET-GRADY test chamber used in official method of National Assoc. of Insecticide and Disinfectant Mfrs. to evaluate household liquid insecticides. Effectiveness of insecticide is compared with Official Test Insecticide on flies of similar susceptibility.

Restrictions

The U. S. Bureau of Animal Industry permits the use of Chlordane in food plants over which it has jurisdiction (meat inspection) as long as it is applied as a stream spray in cracks and crevices, where insects are known to hide. It does not, however, permit its use as a space spray in any plant where edible meat products are handled. If Chlordane were used so that a residue would be left on walls, ceilings and equipment, the U. S. Bureau of Animal Industry would insist upon removing the residue before edible products could be certified.

A new supplement to Meat Inspection Division Memorandum No. 52, which discusses use of Chlordane as an insect spray, will soon be available.

Use of Chlordane and other insecticides in food plants which are using USDA continuous inspection and grading service follows the example of Food and Drug Administration. No particular insecticides are "permissible" or "not permissible." An insecticide must not be used in such a manner that it gets onto or into food being processed. Food or food handling equipment must not be exposed when space spray insecticides are used. Contamination of food by an insecticide, whether direct or through a residue left on food handling equipment, would result in condemnation of that food.—The Editors.

agricultural grade is objectionable for indoor use because of its dark color and comparatively strong odor. The refined grade is non-staining and almost odorless.

Chlordane is certain to kill a wide variety of insects once they have received a minute dose. The precise manner in which it destroys is not known, however. Insects contacted directly are killed quickly. Those not contacted directly pick up a deadly dose by crawling on treated surfaces. Under usual conditions of applications in food plants, most of the vermin die within 24 hours.

The new agent is a contact insecticide. When insects rest on a treated surface or are wet by the spray, they absorb a lethal dose. Ingestion is not necessary, and minute doses suffice to kill most insects. They pick up a lethal dose more quickly from Chlordane-treated surfaces than from surfaces treated with DDT. It has also been noted that insects, especially roaches, are not repelled by Chlordane. Consequently, scattering of an infestation does not occur, following its use. These observations offer some explanation for the greater effectiveness of Chlordane, especially against crawling insects.

How to Apply Chlordane

There are three methods of applying Chlordane, depending in each case upon the type of insect to be exterminated and the duration of effectiveness desired. It can be used: (1) As an air spray for prompt, but not lasting elimination of flying insects such as flies, fruit flies and moths, (2) as a long-lasting deposit applied to exposed and hidden surfaces with which insects come in contact, (3) as a powder in cracks and crevices for prolonged effectiveness against crawling insects such as roaches and ants and (4) as a "stream spray," approved by the U. S. Bureau of Animal Industry.

Because it is compatible with rapid knockdown toxicants such as pyrethrum, Lethane and Thanite, it is recommended as a component of space sprays for the control of flying insects. Chlordane (0.2 percent by weight) will produce 100 percent mortality of house flies within 24 hours. It will thus assure the killing of flies which might otherwise escape the action of rapid knockdown toxicants. Its advantages for such use are: (1) Low percentage necessary for complete kill of flies minimizes the possibility of food contamination, (2) potency of small amounts of Chlordane may destroy insects not contacted directly by spray droplets, and (3) its lack of odor encourages wider use.

For use against crawling insects, a residual deposit (oil solution or aqueous emulsion) is recommended. Since the objective is to deposit a residue of Chlordane on the treated surfaces at the rate of 100 mg. per sq. ft., a spray containing two percent of this toxicant has been found best for all around use.

A semi-coarse wet spray is well adapted for treating wall and ceiling areas. A fine spray diffuses into the air to such an extent that much of the spray is wasted. Operators should be trained to apply the spray so that generous applications are made to crevices and cavities where insects hide and breed. Flat surfaces should receive enough spray to wet the surface without running off. Any good sprayer can be used provided that it can be adjusted to deliver a semi-coarse wet spray, has oil-resistant fittings, and will not spill on the operator.

The emphasis in applying this insecticide should be on getting it into cracks, crevices, niches, bur-

These Formulas Will Help in Preparing Insecticides With Chlordane

TABLE I—SPACE SPRAYS—Suggested Formulations.

Space spray, 0.2 percent (by wgt.) deodorized kerosene base.

Ingredients	lb.
Chlordane	0.2
Knockdown agent (Pyrethrum extract, Lethane, or Thanite)	2.0
Deodorized kerosene	97.8
Total	100.0

Space spray, 0.2 percent (by wgt.) aqueous emulsion.

Ingredients	lb.
Chlordane	0.2
Knockdown agent (Pyrethrum extract, Lethane, or Thanite)	2.0
Deodorized kerosene	10.0
Emulsifier	0.4
Water	87.4
Total	100.0

TABLE II—RESIDUAL SPRAYS—Suggested Formulations.

Residual spray, 2 percent solution (by wgt.).

Ingredients	lb.
Chlordane	2.0
Deodorized kerosene	98.0
Total	100.0

Residual spray, 2 percent emulsion (by wgt.).

Ingredients	lb.
Chlordane	2.0
Deodorized kerosene	3.6
Emulsifier (D-Spers-O-AC)	0.3
Water	94.1
Total	100.0

Residual spray, 4 percent emulsion (by wgt.).

Ingredients	lb.
Chlordane	4.0
Deodorized kerosene	7.2
Emulsifier (D-Spers-O-AC)	0.6
Water	88.2
Total	100.0

TABLE III—INSECTICIDAL DUST.

Insecticidal powder, 5 percent (by wgt.).

Ingredients	lb.
Chlordane	5.0
Pyrophyllite	95.0
Total	100.0

TABLE IV—EMULSIFIERS Suitable for Aqueous Emulsions of Chlordane.

Trade name of preparation	Manufactured by
Arctic Syntex A.	Colgate-Palmolive-Peet Co., Jersey City, N. J.
Atlox 7076 H.	Atlas Powder Co., Wilmington, Del.
D-Spers-O-AC	Planetary Chemical Co., Creve Coeur, St. Louis,
Duponol OS	E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
Glycox 1300	Glyco Products Co., Inc., Brooklyn, N. Y.
Triton X 45	Rohm & Haas Co., Inc., Philadelphia, Pa.

rows, tunnels, wall spaces, conduits, drain openings, and structural cavities where vermin multiply and travel. The pests wet by the spray will die within a short time. Those not contacted directly will be destroyed by the vapor or by contact with the chemical on surfaces over which they crawl. A knowledge of the habits of the specific insects to be controlled will be helpful in conserving the spray liquid.

Insecticidal powders containing Chlordane are also useful against crawling insects. They are well adapted for applications where a narrow deposit must be relied upon for lethal effectiveness, as for example, around ant nests within the structure, and on pathways leading to inaccessible roach harborages. The physical nature of Chlordane dust makes it particularly effective. It tends to adhere to the insect, and vapors from such a dust will kill.

Toxicity—Warm Blooded Animals

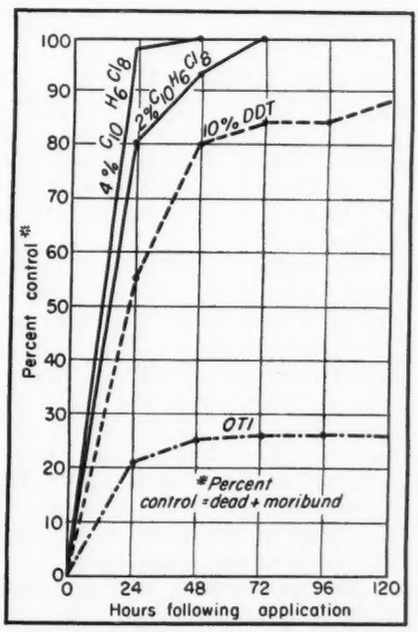
Experiments on animals have shown that Chlordane is of an order of acute toxicity similar to that of DDT. When used as an insecticide, with simple precautions, it is apparently not dangerous to human beings. Because of its superior toxicity to insects, it can be used in low concentrations which are seemingly less toxic to warm blooded animals than are equally effective DDT preparations.

In the manufacture of Chlordane, workmen were repeatedly exposed to skin contact with the chemical and to inhalation of the vapor for nearly a year. They suffered no demonstrable ill effects. Many commercial pest control operators have been spraying the two percent solution for a year or longer. The only reported ill effects have been an occasional case of dermatitis possibly caused by contact with the chemical. All cases have cleared up without medical treatment.

Precautions should be taken to minimize skin contact with Chlordane insecticides. Occasional contact is apparently not dangerous, but repeated or prolonged contact should be avoided. Since the effect of inhaling Chlordane sprays has not yet been determined, it would seem wise to minimize inhalation of such sprays, especially those persons employed as exterminators.

Precautions in Spraying

Avoid using toxic solvents. Since this material is readily soluble in deodorized kerosene and can be emulsified in water (with the addition of a suitable emulsifier), there is no reason for using other substances in making dilute insecticides.



Julius Hyman & Co. chart

COMPARISON of Chlordane ($C_{10}H_6Cl_8$), DDT and the Official Test Insecticide (OTI) of the National Assoc. of Insecticide and Disinfectant Mfrs. for control of 4th instar German roach by direct spray procedure in small chamber apparatus—0.5 ml. dosage.

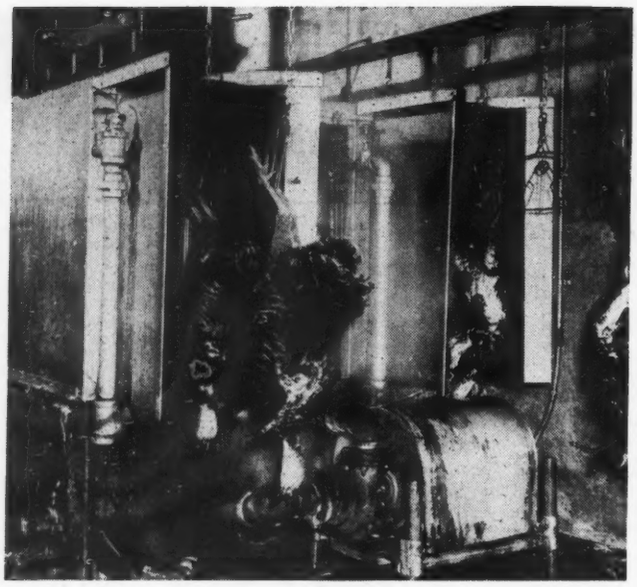
Keep the spray off the skin to as great a degree as possible under actual working conditions. Wear clothes that cover the neck, arms and legs. Wear a hat. Since kerosene has a tendency to irritate the eyes, goggles are advisable when kerosene base sprays are being applied. A respirator or moist gauze mask helps to minimize inhalation of the spray, and oil resistant gloves help to keep it off the hands. Use a clean, dry cloth to wipe off any of the solution that gets onto the skin, and wash the hands with soapy water at frequent intervals.

Avoid spraying inflammable mixtures in the presence of a flame. Kerosene base sprays applied to walls for residual effect should be permitted to dry for about ten hours before introducing a flame into the room. Ventilate the rooms during the drying period to eliminate inflammable vapors.

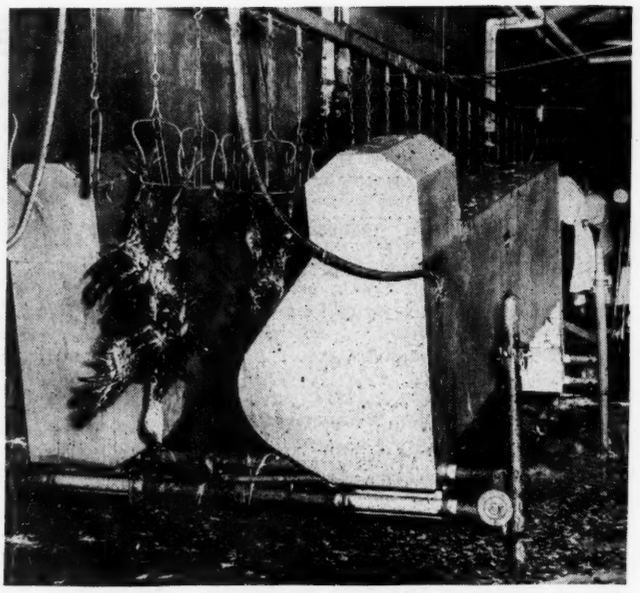
Avoid contaminating foods with this insecticide. Protect foods, equipment and utensils from contact with the spray. Keep supplies of insecticide separate from foods and conspicuously labeled.

Need for Sanitation

It can not be too strongly emphasized that no insecticide, no matter how potent and effective, can take the place of a thorough plant sanitation program. If a food establishment is to be kept clean and free from vermin, the building and the equipment must be maintained in sanitary condition. Foods must be stored so as to inhibit insect life. Insects and insect-infested foods must be excluded. A special effort should be made to eliminate the breeding places within the building and its installations.



1. HYDRO-SPRAY SCALDER sprays hot water under pressure on the turkeys so that the feathers can be easily removed.



2. MECHANICAL ROUGHER is adjustable for any size bird. Here revolving, flexible rubber fingers pick the feathers.

Poultry Co-op's New Plant

Either turkeys or chickens can be handled by duplicate lines. Plant will

By RAY BLOOMBERG
Special Correspondent
Seattle, Wash.

AN ultra-efficient poultry killing and processing plant has recently been placed in operation at Mount Vernon, Wash., to handle 24,000 birds a day. The plant, costing $500,000, was built by the Washington Cooperation Farmers Assoc., Seattle, Wash., an organization established in 1917 to provide a more uniform market and stabilize prices for poultry.

The plant serves 11,450 co-op members within a 65-mile radius, and handles 16,000 chickens and 6,000 to 8,000 turkeys a day. Some of the equipment is so new that it has yet to be proven in commercial operations. For this reason, the co-op selected machines from two manufacturers, shown in the flow diagram as Line No. 1 and Line No. 2. While these lines were equipped by different manufacturers, they are interchangeable and can be used for either turkeys or chickens.

Live chickens are delivered to the plant in trucks by the farmers or are picked up by the association. The association's trucks follow regular routes in picking up the coops of chickens.

At the plant, coops are wheeled into the live storage room holding 10,000 birds. In this room the chickens are then transferred to batteries holding 100 chickens each. The batteries are wheeled outside to the conveyor line where the chickens are hung by their feet on shackles. After the batteries are emptied, they are steamed and disinfected in a stall on the receiving platform outside the live storage room.

Turkeys are not held in the storage room but are killed immediately after they reach the plant. Specified delivery dates and hours are furnished the member-growers so that the lines can run continuously at full capacity.

The turkeys are delivered to the plant in coops, six toms or eight to ten hens to a coop. The coops are lifted from trucks by a power hoist and placed on a roller conveyor line. At this point, the birds are then taken out of the coops and hung by their feet on shackles at the start of the processing line. The coops continue on the conveyor to the front of the plant where they are steamed and disinfected.

The two overhead conveyor lines, on which the birds are killed and plucked, are about 380 ft. long. They operate at a speed varying from 9 to 27 ft. per min., with the slowest speed set for tom turkeys and the fastest for chickens.

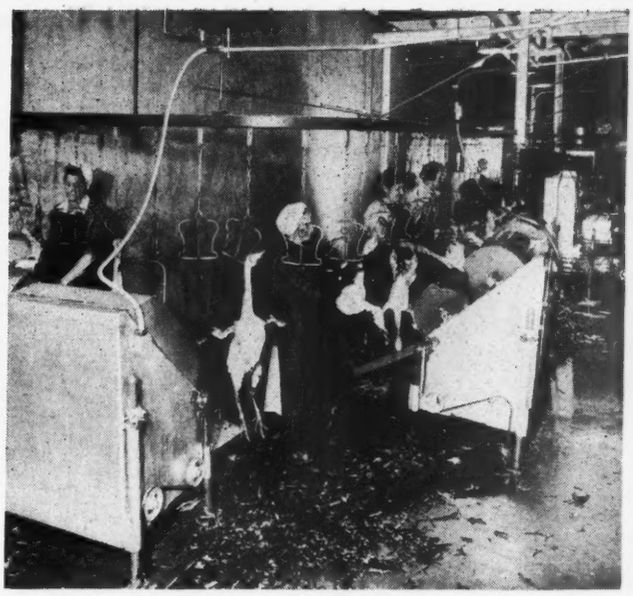
The conveyor consists of a chain of ball-bearing wheels in vertical, then horizontal, positions and inclosed in a rectangular tube. Because of the horizontal and vertical positions of the wheels, the conveyor operates freely, carrying weight on tangents and curves on the line. Each shackle is attached to a clevis which hangs through a slot at the bottom of the tube. The line is at a height placing birds within each reach of operators It is elevated in sections of the plant where handling is not required.

As the birds enter the plant on the overhead line, an operator opens their beaks and inserts an electric killing knife. The knife penetrates the bird's brain and at the same time the jugular vein is severed. The birds are then electrocuted with a 110-volt electrode, attached to the knife, by pressing it against the back of the bird's head. Electrocution reduces the dying birds' struggles, preventing bruises and relaxing the feathers so that hot scalding water penetrates them more easily. Any blood splashed on the walls next to the line is washed off by water sprays.

Scalders

Dead birds go to the scalding unit. Before turkeys enter the scalder, an operator removes tail and wing quills by hand. A hydrospray scalder is used on Line No. 1

3. WING STRIPPER operated by girl (left). Next two operators use double side-line rougher. Fourth hangs birds by heads.



4. SINGLE SIDE-LINE ROUGHER (right) picks feathers from legs after birds are reversed on conveyor line shackles.

Processes 24,000 Birds Daily

evaluate some of the newest equipment, installed by two manufacturers

and an immersion scalder on Line No. 2.

The hydro-spray scalder is completely automatic. It takes 60 seconds for the birds to travel through it. The scalder consists of a single wall tank with an air-activated temperature controller and ten sets of hot water sprays. There are three sprays to each set, and the sprays are pointed in all directions on the birds. The sprays are adjustable and develop a pressure of 30 lb., which is maintained by a 20-hp. motor-driven centrifugal pump.

The temperature of the scalder ranges from 122 to 129 deg. F., depending upon the bird. The birds are completely scalded at a uniform, controlled temperature, with no dry spots remaining on them. As a result, they can be easily picked later on by the rougher.

The immersion scalder is also automatic and it employs the same temperatures that are used in the hydro-spray scalder. Perforated pipes, located at the bottom of the scalding tank, supply the steam required to heat the water. The hot water is agitated by two high-speed propellers.

From the scalder on Line No. 1, the birds enter a mechanical rougher, also unattended. This machine is mounted on hydraulic lifts and has self-equalizing width adjusters to permit quick adjustment on the line. Thus, the machine can be adjusted to pick small or large birds by being raised or lowered and by bringing the two sides closer together. An automatic guide turns the birds while they move through the machine on the overhead conveyor.

Removing the Feathers

In normal picking positions, the entrance to the machine is lower than its exit. Thus the birds move gradually deeper into the revolving picking fingers as they progress through the machine, so that picking begins on the upper part of the body and ends at the legs.

The rougher has flexible rubber picking fingers about 14 in. long and ½ in. in diameter. They are serrated or corrugated so that they can catch and hold on to the feathers, pulling them from the bird's body. They are arranged along two opposing cylinders, both of which revolve toward the center of the machine.

Feathers that drop to the floor from the rougher and scalder are removed by a cleanup man at intervals throughout the day.

Up to this point the two lines are much the same. The birds in each case travel from the killer through the scalder and mechanical rougher. After this operation, birds on Line No. 2 travel through a rougher and wing-stripper before pinning. They are then singed by hand and hung on cooling racks.

Stripping the Wings

On Line No. 1, two wing strippers are set up next to the automatic rougher. Each stripper requires one operator. The two strippers are needed when chickens are being processed, but only one is required for the slower-moving turkeys.

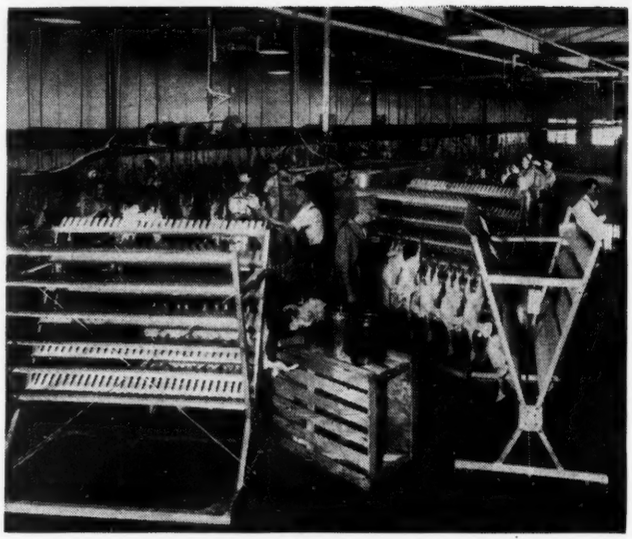
The wing stripper has two directly opposed revolving steel cylinders, set close together. The operator inserts the wing feathers through a horizontal wire grating into the cylinders, which pluck the feathers from the wings. This machine removes the short, tough quills from the tip of turkey wings and takes the flight feathers from chicken wings.

Double Side-Line Rougher

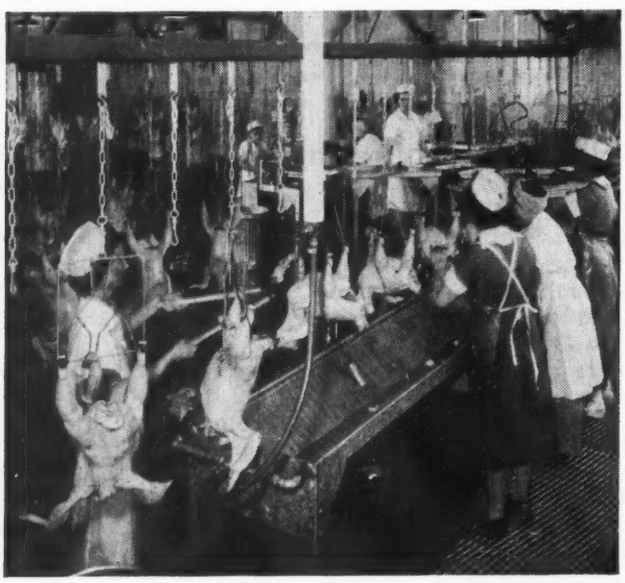
The next machine on Line No. 1 is the double side-line rougher. It has two dual-drum units and requires two operators who stand off the wet floor on raised platforms. The machine derives its name from its position at the side of the overhead conveyor line. It allows the operators to work freely as the birds pass along the line without interfering with the picking drums.

Here Turkeys Are Pinned, Precooled, Eviscerated and Packaged

5. PIN FEATHERS are removed with pinning knives. Birds then pass through electric-gas singer and spray scrubber-washer.



6. PRECOOLING TURKEYS on racks to lower their internal temperature to 36 deg. F., required by federal regulations.



7. EVISCERATING room has two identical conveyor lines. One line is used for chickens and the other is for turkeys.

8. PACKAGING operation consists of wrapping turkeys in a transparent bag, weighing and packing them into boxes.

The counter-rotating drums on this rougher, powered by two motors, revolve at 66 r.p.m. The stripper bars on the drums are made of gum rubber, which clings to and removes the feathers. The rubber also prevents injury to the operators' fingers. This machine is mounted on hydraulic lifts to permit rapid adjustment in the height of the machine.

When operating these roughers, one operator grasps the wings against the legs and inserts the neck between the revolving drums. Another operator holds the body and the neck and inserts each wing in turn. The 4-in. picking fingers remove most of the feathers remaining on the upper parts of the bird.

In the next step, birds on Line No. 1 are manually reversed on the conveyor line shackles so that they now hang by their heads. This permits the picking of feathers from the bird's legs by a machine identical in design and operation to the double side-line rougher. The machine has a single unit of dual cylinders, with gum rubber fingers for picking, and requires only one operator.

Removing Pin Feathers

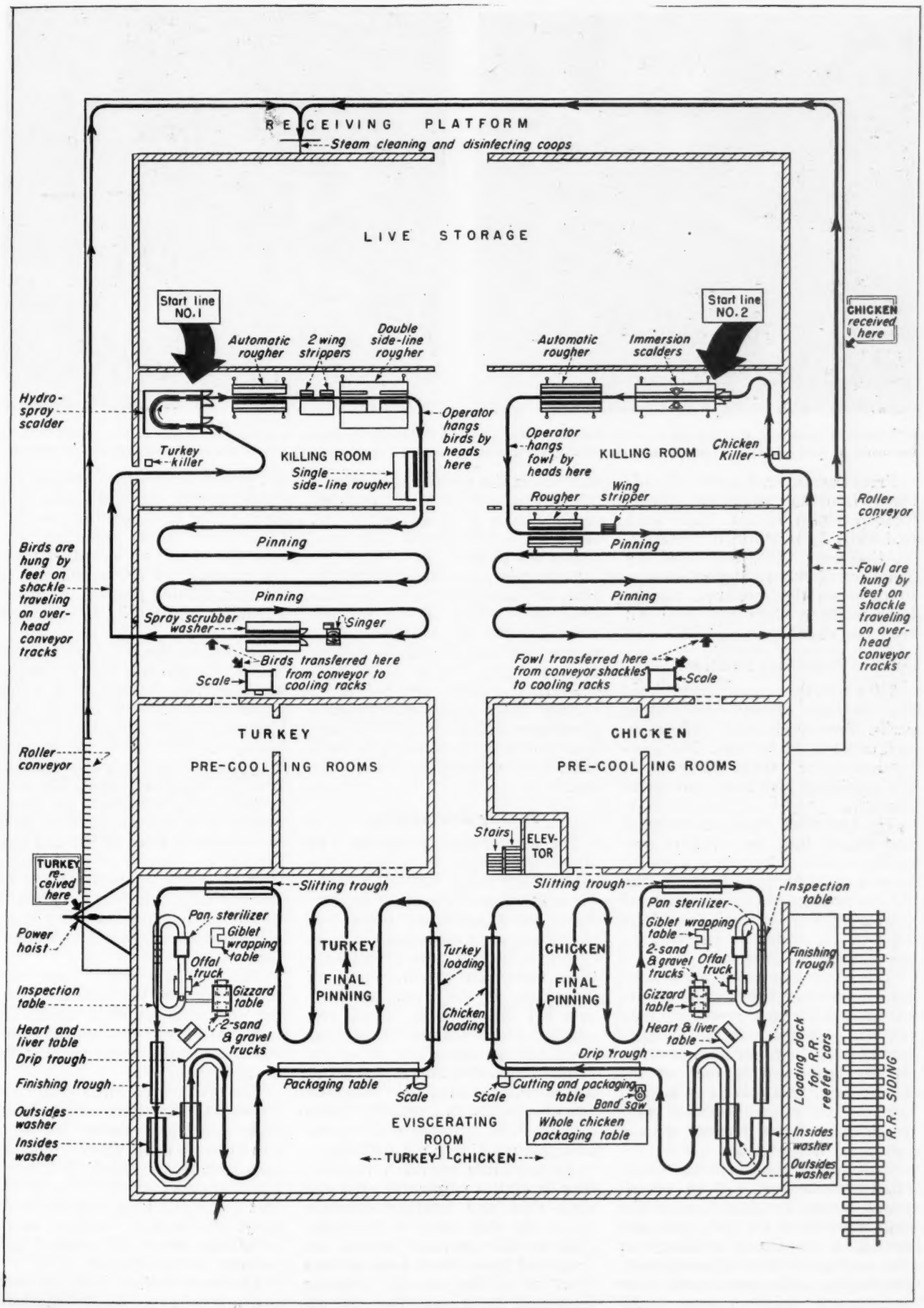
Birds then move into the pinning department, where 60 to 75 operators select and follow a bird along the conveyor, removing pin feathers with a pinning knife. The turkeys are again reversed, so that they hang by their feet, but the chickens continue hanging by their heads.

These operators pin 70 turkeys or 500 chickens in an eight-hour day. They are paid $0.96 an hour when working on chickens and $1.015 for turkeys, with a $0.02 bonus on each turkey they pin, provided they remain throughout the October-December turkey season.

Singing the Poultry

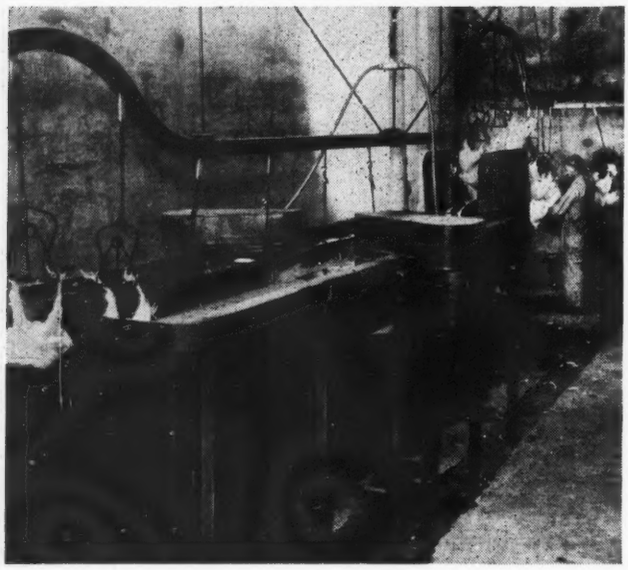
Next on Line No. 1 is the electric-gas singer. It consists of 36 gas jets, which automatically singe the bird completely and uniformly without burning. An electric eye, located near the conveyor, is actuated when the circuit is broken by the passage of a hook-and-shackle. The eye opens a gas valve and the gas is ignited. When the shackle has passed through the electric eye, the gas valve closes.

Poultry Processing Is Speeded on Two Different Conveyor Lines



MACHINES for the two lines were supplied by two manufacturers. One maker equipped Line No. 1, the other Line No. 2.

Lines Are Interchangeable for Handling Chickens and Turkeys



AUTOMATIC immersion scalders are used for chickens, which are immersed in water heated by steam and agitated by propellers.

ENTRANCE to rougher is lower than its exit so that feathers can be picked from the upper part of the body and the ends at the legs.

From the singer, Line No. 1 birds move into an automatic spray-washer, which sprays birds with cold water under 40-lb. of pressure. At the same time, two revolving cylinders of rubber fingers, similar to those on the roughers, remove loose feathers, blood and blood clot from the mouth.

Precooling Poultry

They are then transferred from the overhead conveyor to cooling racks. Each rack holds 180 chickens, or 24 to 40 turkeys. The overhead conveyor lines continue out to the receiving platforms, to repeat the cycle.

The bird-filled racks are weighed and moved into one of four precooling rooms, where they are kept from 6 to 24 hours at 30 to 32 deg. F. Precooling lowers the internal temperature of the birds to at least 36 deg. F., which is required by government regulations.

The precooling rooms have a total volume of 35,500 c.f. and a combined capacity for precooling 80,000 lb. of poultry daily. A minimum of 3,600 c.f. per min. of air is in circulation within each of the four rooms. This volume of air and temperature range provides rapid precooling of the poultry with a minimum weight loss.

Sodium chloride brine is circulated from a small 1/3 hp. centrifugal pump, keeping the cooling coils free from ice and frost and providing maximum efficiency of the cooling surface. Consequently, the cooling coils operate with high refrigerant temperatures which contribute to higher relative humidities in the precooling rooms.

Chickens are left on portable cooling racks in these rooms, but turkeys are transferred to permanent racks to save space.

From the precooling rooms, the birds are routed either to the eviscerating room or to the packing crew in one of the precoolers, where they are packed New York dressed style. When New York dressed, the birds are packed in wooden boxes lined with freezer-proof paper. Each box of turkeys has four to six toms or eight hens. Chickens are packed 6 or 12 to the box.

Poultry Evisceration

The eviscerating room has two identical conveyor lines, about the same length as the killing lines, one for chickens and the other for turkeys. When birds are taken into the eviscerating room from the precooling room, they are placed on a table where an operator cuts off their legs at the knees and also cuts out the oil sack. Birds, prepared for evisceration, from other co-op killing plants also enter the plant's production line at this point. An operator hangs the birds on shackles, head down, and they move over 60 ft. of conveyor while operators pick remaining pin feathers.

As the birds approach the slitting trough, an operator slits the neck skin and another operator works the skin down to the body. Still another operator loosens the crops and three others remove them over the slitting trough, dropping them into waste cans. The next operator on the line cuts the wind-pipe and gullet, after which another operator inserts the bird's neck in a shackle. The birds are now suspended at three points—neck and two legs. The next two operators make a horizontal cut above and around the vent, making possible the easier removing of entrails by the next two workers.

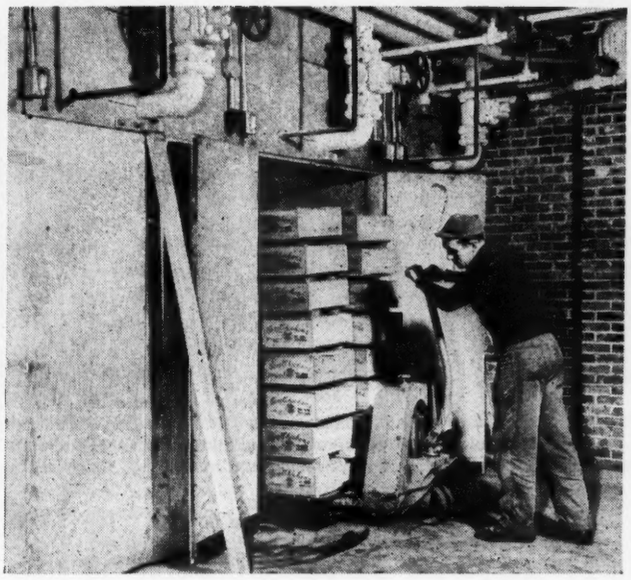
The line at this point passes over an oval inspection table. Here stainless steel trays, attached to a conveyor, travel directly beneath each bird as it moves along the overhead conveyor. The entrails are dropped into one of the trays and examined for internal disease. The next operator snips out hearts and livers, washes them in water running along the trough in front of her and puts them in a collander on an adjacent table. The last operator at the inspection table snips out the gizzards and drops them down a chute to the gizzard station, where four workers clean them.

The stainless steel trays continue on around the table and dump the offal into an offal truck. The trays then enter an enclosed steam sterilizing unit before making the rounds again.

The eviscerated birds meanwhile travel to the finishing trough, where three operators remove the lungs and kidneys, using special tools for each task. At the end of the trough, a worker cuts the neck in two places, just below the head and above the body. The head is dropped into a receptacle, while the severed neck remains on the shackle.

The next worker, using an 80-lb. pressure sprayer, washes the birds clean of extraneous material re-

Packaged Poultry Is Frozen and Then Shipped in Refrigerator Cars



LOADING a pallet containing 16 boxes of chickens into one of 15 freezers. The same freezers are used for the turkeys.

REFRIGERATOR CARS are loaded with boxes of frozen turkeys. Eviscerated turkeys are packed six to eight to a box.

maining in the cavity. The birds are then conveyed through an automatic outside-washer that washes the outside of the birds. The birds are dried by an air blast as they move along the conveyor.

From this point, the operation varies with the type of bird being processed. The birds are divided into four classifications: (1) Full drawn fowl, roasters or turkeys; (2) pot prepared birds, cut-up fowls, for stewing; (3) pan prepared, cut-up young frying chickens and (4) split broilers.

Packing Eviscerated Poultry

As the eviscerated turkeys reach the packaging table, one operator takes the neck from the shackle and drops it into the bird's cavity. The same worker also places a heart, gizzard and liver in the cavity. These are picked up from a collander in front of the operator. The collander is refilled as needed from the heart, liver and gizzard stations. An operator then takes the turkeys off the line and tucks the legs into the cavity, where they are held by a strip of skin remaining below the vent. The turkeys are then passed across the table to another operator who places them on the bagger.

The turkey bagger was invented by the co-op's plant superintendent. It consists of a semi-circular metal basket, held to the side of the table by a hoop over the middle of the bagger. Unless intended for institutional use, turkeys are wrapped in a transparent plastic bag (re-usable for refrigerator storage). The bag is stretched over one end of the bagger. The turkeys then slide down the basket and bag and each turkey is then placed on the conveyor table.

The next worker attaches a suction hose to the bag to remove surplus air. The next operator twists the bag to prevent air from entering and ties it with a wire containing a tag with defrosting instructions. At the end of the table the birds are weighed and the weight is marked on each tag. Turkeys are then packed six to eight to a box and placed on flats. The turkeys are packed loose so that they are not deformed. They are then taken down the elevator to the freezers.

When eviscerated turkeys are packed for institutional use, they are weighed four together and the four turkeys placed unwrapped into boxes, covered with a wet spruce mat to prevent freezer burn.

Full-drawn chickens are not individually wrapped, but are weighed six together and placed in a cardboard carton, which is then sealed.

Pot and Pan Prepared Birds

Pot prepared and pan prepared birds are split with a band saw, and wings and legs are removed. All parts are then placed on a conveyor and assembled in individual cellophane-lined cartons. The heart, liver and gizzard are wrapped in parchment at a giblet-wrapping table and then packed in the carton. The cartons are then placed in a master container, six to the case.

On the flats, the boxes are separated by 3-in. strips of wood to permit air circulation. Birds intended for canning are packed 100 lb. to the box and shipped to the association's cannery in Seattle.

The plant has 15 freezing rooms with a combined freezing capacity of 80,000 lb. of poultry daily. All 15 rooms are installed adjacent to each other and are refrigerant-controlled in groups of five.

Each room is 10 ft. high, 4½ ft. wide and 17 ft. 2 in. long. Special double nested ammonia refrigerated "VW" coils are installed overhead in each room in connection with an axial flow fan. Adjustable louvers and dampers in the rear of each room secure proper adjustment of air flow.

Air at the rate of 7,500 c.f.m. circulates among the pallets containing the poultry at temperatures as low as —40 deg. F. The fan draws air through the coils and forces it down the back wall and through a directional louver and thence around the product.

The frozen poultry is stored in the low temperature holding room which has a volume of 54,800 c.f. and a capacity of 340 tons of poultry. A temperature of 0 deg. F. is maintained in this room by the use of two automatically controlled water defrost floor mounted air cooling units. A 3-hp. fan motor on each air unit circulates 10,000 c.f. of air per min.

Freezer storage has two loading ports, 30x30 in., opening onto the railroad car loading platform. When cars are being loaded, a canvas-inclosed conveyor connects with the cars and loading ports so that the product moves from storage room to railroad reefer in a continuous environment of low temperature. Refrigerator trucks are also used.

Austin Jones, Kerotest Mfg. Co. photo

SPEAKERS' TABLE at the ASRE Welcome Luncheon. Left to right: Clifford F. Holske; Paul B. Christensen; Dr. Edgar Ross, chairman, entertainment committee; R. H. Money; Dr. M. D. Whitaker, president Lehigh University, who spoke on "Education and Our Birthright"; Burgess H. Jennings; R. C. Jordan, chairman, educational committee; and Edward Simons, 1947 program chairman.

Developments in Refrigeration Reviewed at Atlantic City

Handling materials in the refrigerated warehouse and low temperature storage of nuts among problems discussed at 43rd annual meeting of ASRE

MODERN materials handling in cold storage warehouses and refrigerated storage of edible nuts were subjects of special interest to the food industry featured at the 43rd annual meeting of the American Society of Refrigerating Engineers held in the Hotel Traymore in Atlantic City recently.[1]

P. D. Christensen and D. O. Haynes, Merchants Refrigerating Co., New York, pointed to the need of considering storage space and slow turnover (about 90 days on the average) of goods, in the application of a materials handling system in a cold storage warehouse. Space is valuable because of the high investment in building, insulation and refrigerating equipment, consequently, space is at a premium.

Three Problems

Three problems involved in the handling of goods in cold storage warehouses were outlined. They consisted of: (1) Unloading and loading goods in freight cars and trucks, (2) transporting goods to and from the storage rooms and (3) tiering and untiering goods in storage rooms.

The value of space in a cold storage warehouse prohibits the use of conventional fork trucks. Therefore it was not until a modified fork truck was developed for use in cramped quarters that it became possible to consider the fork-truck-pallet system. This modified truck, a mobile, self-powered stacker, carries the load by means of outriggers on the front. Furthermore, it is tiller-bar-controlled by an operator walking with it, rather than operated by a man riding on the machine and using a steering wheel and levers.[2]

The truck requires a semi-wing-type pallet with an overhanging upper deck so that the outriggers can get under the sides of the pallet, rather than straddling it.[3]

The outriggers permit the truck to operate in 55-in. aisles. While this is about a 30 percent increase over the 43-in. cooler aisle width used in hand piling operations, it is, however, better than the 220 percent aisle space increase required for conventional fork trucks. At the same time it was found that the total piling height can be increased with many commodities, offsetting the loss in floor space.

Pipe coils overhanging in the aisles presented difficulty in the use of fork trucks. This was overcome by placing aisle tiers parallel to the coils, making sure that the last tier in each lot was placed one pallet-load high at right angles to the coils. As a result, the last pallet-load can be removed first in breaking out a lot. There are also instances where rearrangement of the coils has solved the tiering problem.

Pallets Selected

Another problem in the use of the fork-truck was the size of the pallet. Two sizes, 36x46 in. and 24x 48 in., were selected after some study. The larger pallet is used for the largest number of packages and containers handled, while the smaller ones are used for barrelled goods and other units, such as citrus crates. The two sizes provide a flexibility to the stacking arrangement because they can be inter-mingled to make the best use of available floor space.

Now that the average cold storage room can be palletized, the next step is to get the loaded pallets to and from the rooms. Movement of

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[1]Abstracts of other papers presented appear on pages 199 and 206.

[2]It is manufactured by Moto-Truc Co., Cleveland, Ohio.

[3]Pallets were designed at Merchants Refrigerating Co.

IN BEHALF of the American Society of Refrigerating Engineers, Charles Logan, a former president, presents the retiring president, R. H. Money, with a gift of appreciation for his year of meritorious service (left). (Right): Horace Wilson, president of the American Association of Refrigerated Warehouses, and Dr. Mary E. Pennington are not discussing serious refrigeration problems.

pallets on and off elevators presents several problems. In the first place, elevators are often too small and do not have the capacity to carry even the lightweight outrigger type of fork truck and two loaded pallets simultaneously. Furthermore the outrigger type of fork truck is a comparatively slow piece of translating equipment. The motorized pallet jack is the best solution to this problem since it is faster than the pallet hand jack in picking up and transporting pallets.

Storage of Nuts

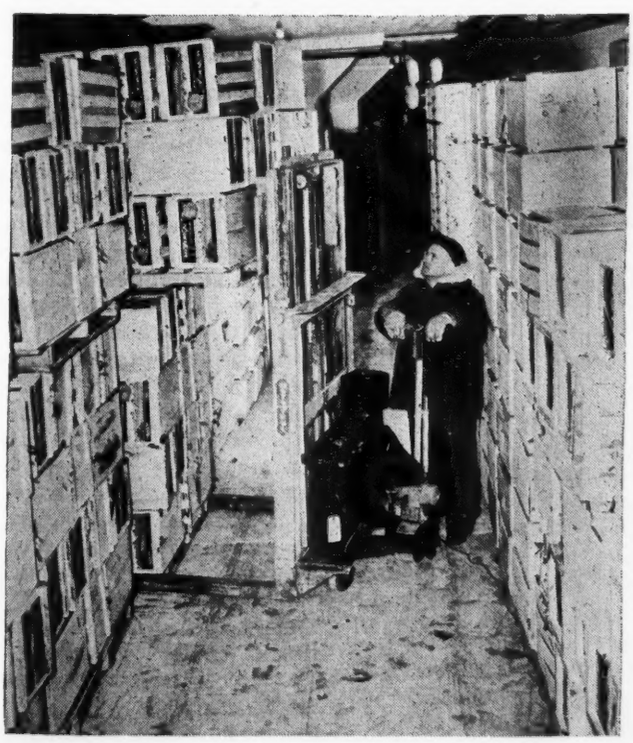
Discussing "Refrigerated Storage of Edible Nuts," C. T. Baker, Atlanta, Ga., considered peanuts and pecans, the two nuts representing the greatest tonnage in the southern states. When peanuts are to be stored for 6 to 8 months, Mr. Baker recommended a temperature of 32 to 34 deg. F. with a relative humidity of 75 to 78 percent. For longer storage periods a temperature below 32 was recommended.

Pecans are successfully stored at 35 to 36 deg. F. and at a relative humidity of 90 to 92 percent. Humidities of 80 to 82 percent result in loss of oil and a slight rancidity.

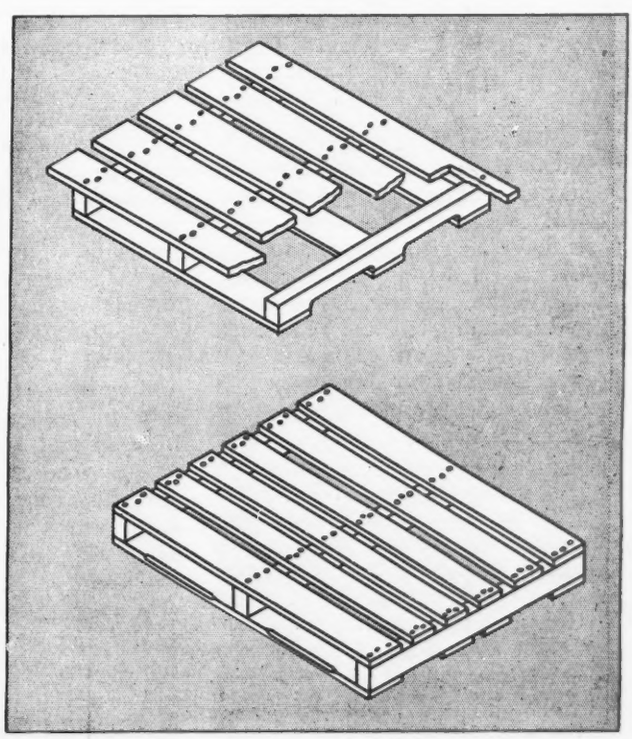
For cooling nut storage rooms Mr. Cox recommended fan type unit coolers using ammonia. By the use of solenoid valves on the inlet and suction lines a uniform temperature is maintained. Nuts stored in bags should be stacked in a manner that insures free circulation of air.

Officers Inducted

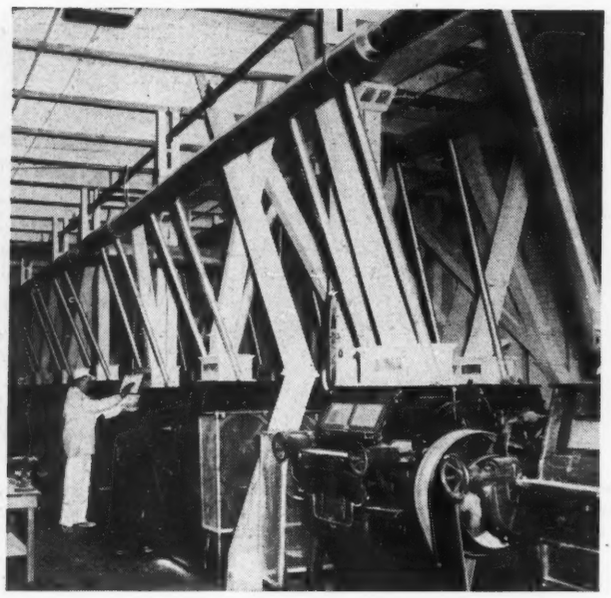
Following the final technical session new officers for 1947-48 were inducted. They were: C. F. Holske, eastern sales manager, Vilter Mfg. Co., president; B. F. Jennings, professor of mechanical engineering, Northwestern University, and J. G. Bergdoll, works manager, York Corp., vice-presidents; P. B. Christensen, vice-president and general manager, Merchants Refrigerating Co., treasurer; and M. C. Turpin, secretary. C. M. Ashley, Carrier Corp., was elected program chairman to succeed Edward Simons.



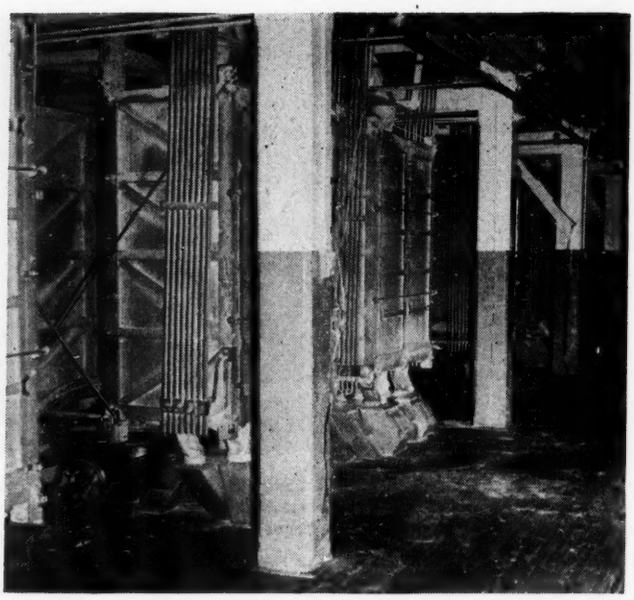
MODIFIED FORK TRUCK for use in cramped quarters carries load by means of outriggers on the front. This saves aisle space.



SEMI-WING-TYPE PALLET with overhanging upper deck (above) for use with modified fork truck. Standard type pallet (below).



1. ROLLER MILLS are usually used in wheat milling. Following cleaning and tempering of the grain, wheat is ground in series of mills shown in this illustration.



2 SIFTING follows grinding, as mill stock moves to enclosed sieves to be classified according to particle size. The oversized particles return for regrinding.

Infra-Red Toasting Unit Speeds Wheat-Germ Processing

Continuous operation replaces batch method with reduction in cost, increase in nutritive value and improvement in quality of product

By D. B. PRATT, JR., Director of Laboratories, B. A. Eckhart Milling Co., Chicago, Ill.

PRODUCTION of approximately 2000 lbs. of processed wheat germ per 8-hr. day in a 6,400-sack capacity flour mill has been made possible by a continuous method using infra-red toasting to inactivate fat-splitting enzymes. Heat-treating on a batch basis and at a much slower rate in an ordinary gas-fired coffee roaster has been the previous and usual practice.

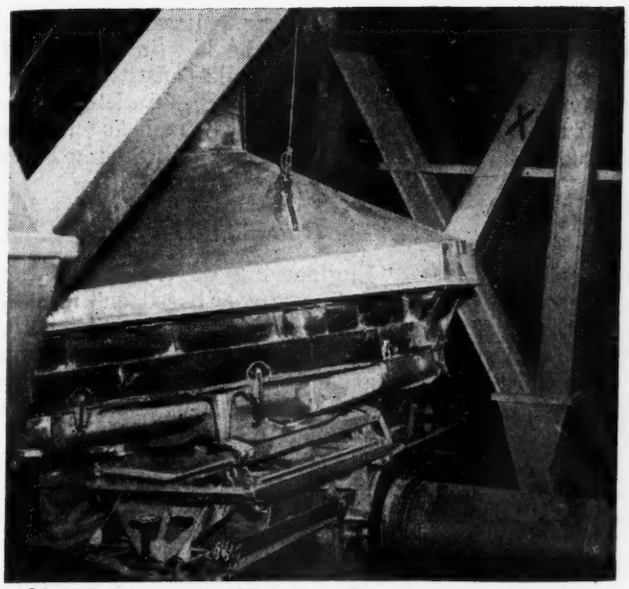
In operation, the toasting unit consists of a bank of 250-watt infra-red lamps mounted on 5-in. centers at not less than 4 in. above the exposure surface over which the germ passes in a single layer. This exposure surface is, in effect, a vibrating table or stationary conveyor set at a slope of 15 deg. Its length is determined by the desired exposure time and by the frequency of the vibrations. Volume of germ to be treated per hour determines its width. A surface 36 in. long and 24 in. wide vibrating at a frequency of 150 per min. permits processing of 250 lb. of germ per hour at 450 to 500 deg. F. for 15 sec. A bank of 28 lamps is required for an exposure surface of these dimensions.

Supplementary equipment includes: (1) A germ separator in the milling line, (2) spouting connection to feeder mounted over the high side of the exposure surface, (3) a feeder designed to supply germ to exposure surface at a uniform rate and (4) a bucket elevator connecting discharge hopper with the filling machine or packing hopper. One ¼-hp. motor drives the feeder and bucket elevator in addition to shaking the toasting table.

The advantages of the continuous process include the following: (1) It can be tied in with wheat milling operations to process the germ immediately after its removal from the mill-streams, (2) it requires only minimum supervision to obtain a final product of uniform quality, (3) it gives improved retention of natural vitamin content and (4) it reduces likelihood of insect infestation.

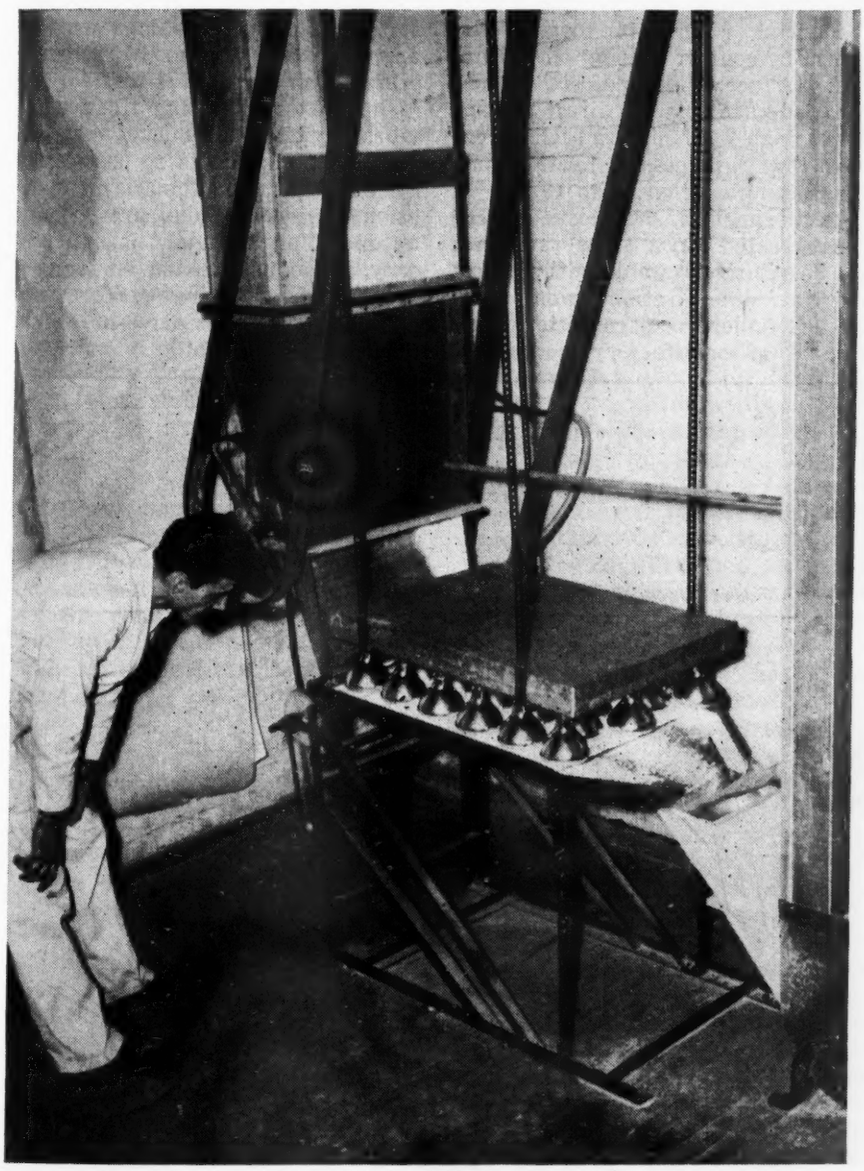
Among the disadvantages of the batch method have been: (1) Low production rate, requiring about 10 min. per charge of 8 lb. per roaster to obtain the best results, (2) necessity for constant supervision to achieve an end temperature of 500 deg. F. without scorching and (3) toasting losses of 25 to 30 percent of natural thermolabile vitamin components.

In spite of these disadvantages, the batch process has been generally accepted and used because vitamin assays show that the nutrient content of the final product is still high enough to make wheat germ



3. GERM is separated here from feed stream which enters from spouting X. Wheat germ was not recovered prior to 1940, since there was no practical means of separation.

4. SEPARATION depends on specific gravity. Germ flows from spoutings at right end of table, as riffle plate vibrates. The spoutings at left carry feed off to packing unit.



5. TOASTING unit receives germ by gravity flow from separator. Motor-driven eccentric shakes table, conveys germ in single layer under battery of 250-watt infra-red lamps.

6. BUCKET elevator takes germ to hopper where it is filled into 8-oz bags.

7. GERM is packaged in Cellophane bags, has shelf-life of 18 months.

a rich and valuable source of the B-complex and vitamin E.

Possession of these potent nutrients, in addition to its other food values, is the reason for the commercial interest in wheat germ for the human diet. Strange as it may seem, however, mechanical or quantitative separation of the germ from the animal-feed mill streams was not practical prior to 1940. At present, several machines recover it relatively free from bran, shorts and mill dust.

Heat Stabilizes Germ

Although its mechanical separation had been accomplished on a commercial scale, packers of wheat germ found that they had a serious marketing problem. The germ in its raw state is highly palatable with a pleasant nutlike taste. But it is unstable because of its oil content, which oxidizes in a short time at normal storage temperatures to acquire definitely unpleasant odor and taste, characteristic of rancidity. Attempts to overcome this instability included hydrogenation of the oil, addition of antioxidants and heat-treatment. Hydrogenation proved to be too expensive in relation to supply of available germ. Antioxidants have been in short supply and are not fully proven for human consumption. Heat-treating, however, proved effective at 450-500 deg. F. for periods up to 2 min. It stabilizes the germ through inactivation of the fat-splitting enzymes and also improves its flavor in a manner and degree similar to the roasting of nuts to a light brown color.

Toasted in a Single Layer

Initial efforts to overcome the disadvantages of batch roasting involved the use of a small aluminum conveyor operating with magnetic vibration under a bank of 250-watt infra-red lamps. Desired results were obtained in 30 sec. when the germ on the conveyor was limited to a single layer and the operation carefully supervised and timed. A high heat-loss resulted, however, through reflection from the bright surface. This condition was corrected by covering the aluminum surface with a light gage black metal sheet.

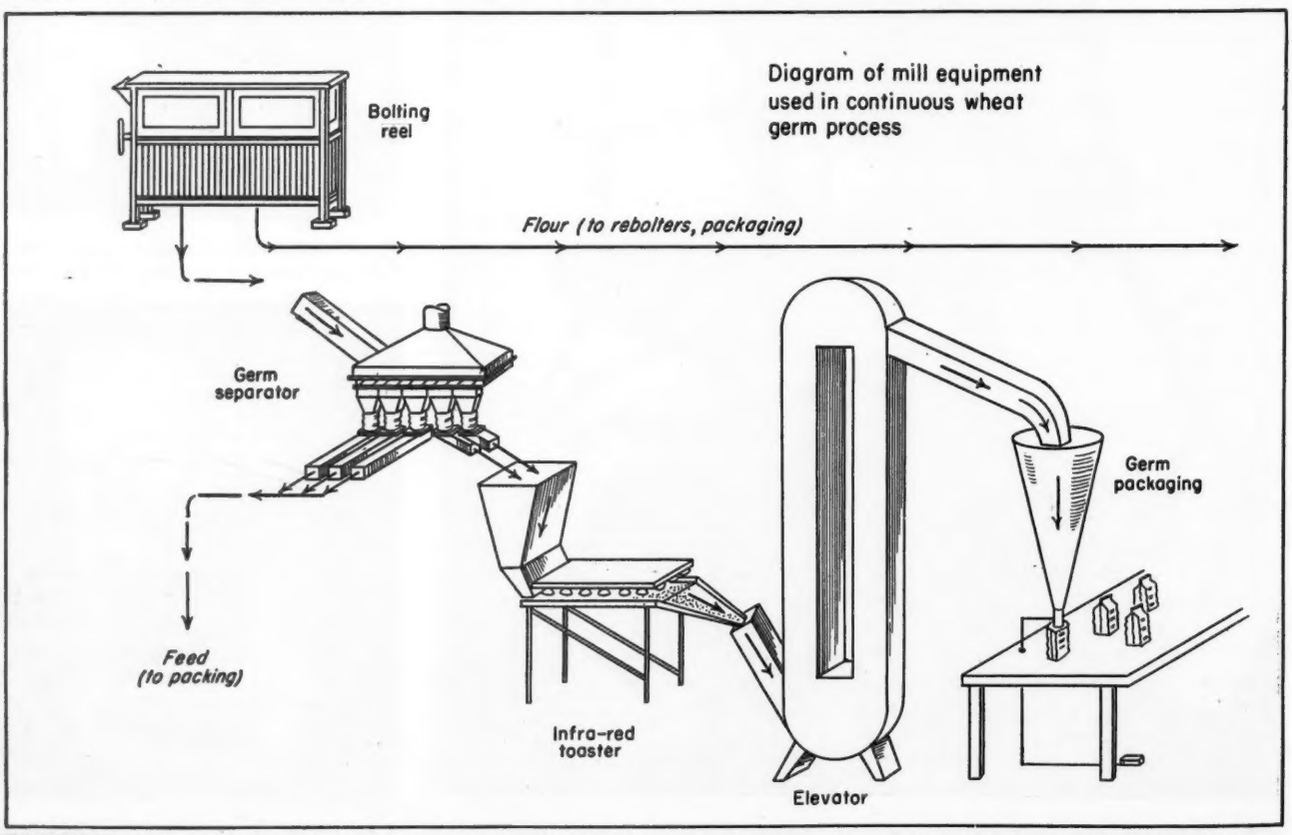
The heat-absorbing property of the black metal gave an unexpected beneficial result. It toasted the germ by contact heating on the under surface. This indirect contact heat supplements the direct radiant heat from the lamps to such an extent that the necessary heating time has been cut from 30 to 15 sec.

Experimental shelf-tests on the heat-treated germ show the germ to be relatively stable with respect to fat deterioration even when stored under room conditions, and to be of satisfactory quality in other respects. Vitamin assays indicate that the loss in potency of the thermo-labile constituents during the 15-sec. exposure is only 5 to 10 percent in comparison with the 25 to 30 percent loss during batch roasting.

Operating Costs Low

Engineering of the installation now in use was based on the data obtained during the experimental studies—and with such good results that operation costs are surprisingly low. The 250-watt lamps used are rated to have an effective life of 1,000 hr. Performance has shown this claim to be an understatement. Even though these lamps have been in service for three years, under varying conditions during the experimental studies and until the details of the present procedure had been standardized, replacements do not yet amount to 50 percent of the expected rate. Current demand for each of the 28 lamps used is approximately 2.2 amp. The only other power required is that for the ¼-hp. motor operating the feeder, vibrating table and bucket elevator.

The installation is so completely mechanized and automatic in operation that continuous presence of an operating attendant is unnecessary. Periodic checking on temperature and operating performance three to four times per 8-hr. working day is sufficient.



FLOWSHEET shows operations of separating and processing high protein wheat germ. Toasting step insures stability of nutlike flavor.

A Bottler Tackles Truck Delivery Problems

Competent driving is one answer, but there are other aspects of beverage distribution that the truck owner might well consider

BY COMBINING deliveries of soft drinks and bottled water, particularly on suburban routes, distribution costs have been reduced during periods of slack demand.

GOOD drivers, those who know how to get rid of a good-sized load or loads within the limits of the working day, are perhaps the most important elements in the retail delivery of bottled spring drinking water as established by the Minnehaha Water Co., Cleveland.

But there are also other problems to be solved if the cost of bottling and distribution is to be maintained on a profitable basis. These other problems include: (1) The method of transfer of the water from the spring to some centrally-located city distribution plant, (2) the number of handlings of the 5-gal. bottles or demijohns between the bottling and the final delivery to the customer, (3) the establishment of an economical delivery radius, (4) the cost of bottle breakage, (5) the protection of the load against freezing in winter weather, (6) the type of route truck bodies employed to expedite the unloading of the full bottles and the loading of the empties.

Cut Costs

As told in the September, 1947, issue of FOOD INDUSTRIES, the Minnehaha company reduced the cost of the transfer of the full and empty bottles between spring and distribution plant by the elimination of one unloading and one loading operation. This is accomplished by the use of semi-trailers, which serve as loading and unloading platforms at each end of the route. At the city distribution plant, the final delivery route trucks are loaded and unloaded directly from the semi-trailers, with the former loading and unloading platforms eliminated.

The Minnehaha company has found a 15 mile radius to be an economical delivery area. Deliveries of drinking water, within those limits, are made at a selling price of 70 cents per 5-gal. bottle. Because people usually drink more water in the summer than in the winter, there are also high and low peaks in the volume of deliveres. This amounts to a reduction of approximately 20 percent in the winter.

New Lines

The company also entered the ginger ale and root beer bottling business as an allied line. The processing and bottling of these beverages are done at the same city plant from which the drinking water is distributed. Naturally these additional products help reduce distribution costs. On the suburban routes where the stops are farther apart, the delivery route trucks carry cases of soft drinks and demijohns of water.

For its route trucks, the Minnehaha company has standardized on G.M.C. Model 303 cab-over-engine types with bodies capable of carrying from 78 to 84 demijohns of water.

Many distributors, including Coca-Cola, use the multi-platform or shelf bodies, with 24 small bottles carried in wooden cases. The Minnehaha route truck body consists of a single clear platform set directly on top of the chassis frame. It has solid front and rear transverse sections. Along each longitudinal edge of the platform and extending from the front to the rear transverse sections are tip rails each set 3 or 4 in. above the level of the platform floor.

To load the water demijohns, one row is set longitudinally down the center of the body with the crates laid crosswise on their sides. This row is three crates high and nine crates long or 27 crates in all. Next, two side rows of crates are loaded, each three crates high and nine crates long, giving a total load of 81 crates.

The crates cannot slide off the side of the body while the truck is in motion because the two outside rows of crates are each pitched toward the center of the body by having the outer ends of the crates resting on the tip rails.

Each water route truck is regulary operated by one man. Except on initial deliveries, or when the customer requests both the bottle and the crate, the driver makes the delivery by withdrawing the full bottle from one of the outside rows of crates.

Shifts Load

He carries the full bottle to the customer, leaving its crate in place on the truck and returns with the empty bottle which is inserted into the empty crate. This operation is repeated until all the bottles in the ouside rows of crates are delivered. Then the load is rearranged, the full bottles are transferred to the outer and the empties to the inner rows.

Protection against freezing of the water and cracking of the bottles in below 32 deg. F. weather is accomplished in two ways. When the bottles start to freeze on the downtown routes close to the city plant, the driver returns and shifts his load for warmer water. On the longer suburban routes, the load is covered with a tarpaulin and two kerosene lanterns are lighted inside.

OLD WOODEN TABLES for packing olives are unsanitary and difficult to clean.

NEW STAINLESS STEEL TABLES have many sanitary features. Here they are being used to "place pack" stuffed olives at the B. M. Reeves Co.'s Brooklyn, New York, olive plant.

New Packing Tables Designed

Stainless steel tables are more sanitary than wooden ones. Special details

By JOHN V. ZIEMBA
Assistant Editor
"Food Industries"

STAINLESS steel packing tables with many sanitary features have been designed and developed recently through the combined efforts of certain food packers, Pressed & Welded Steel Products Co., Inc., L. I. C., N. Y., and representatives of the New York City Department of Health. Some of these tables are replacing old style linoleum-top wooden tables used for packing olives. Stainless steel tables are easy to clean, require no replacement of materials, are economical to manufacture and have been adopted by other food packers in operations requiring hand picking, sorting and cutting.

Development of the tables actually started about two years ago when Max Ams, Div. of Airline Foods, Inc., N. Y. C., asked a table manufacturer to design new stainless steel olive packing tables that could be easily cleaned. A table was accordingly built meeting the needs as first presented. Subsequent inquiries were made by other packers for stainless steel tables with slight changes in design. Individual olive packers wanted tables of different sizes, fitted to their own requirements.

To manufacture these stainless steel tables economically, it was necessary for the table manufacturer to design a table that was acceptable to olive packers generally. This was accomplished by pooling all the information from olive packers on their table requirements and incorporating the most desirable features and recommendations in an acceptable design. Now, with one standard style table, acceptable to most packers, the equipment manufacturer has increased his production and reduced the price of his tables.

New technics in stainless steel fabrication and experiences from extended field tests also enabled the table manufacturer to turn out better tables.

Disadvantages of Wooden Tables

Food packers and health department officials have long recognized the sanitary defects of conventional wooden packing tables. In the first place, sanitary and seamless packing tables cannot be built from wood. Insects breed in seams, joints, crevices and the understructure of the wooden tables. Furthermore, dirt accumulates under wooden table legs.

Wooden tables are difficult to move for cleaning purposes because of weight and structural weakness, and operators often get splinters. Wood is not satisfactory for steam hosing, and daily washings prevent thorough drying of the tables. The tables also get dirty easily and require frequent painting.

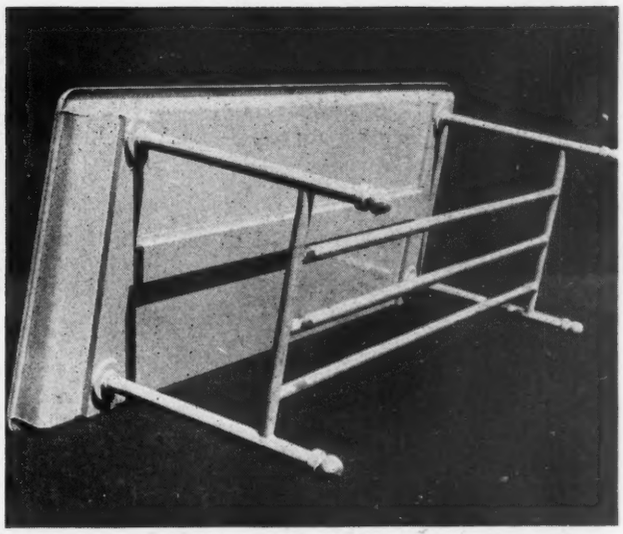
Understructure Important

Construction of a table to meet sanitary requirements is not difficult. The table manufacturer concentrated on the sanitary features of the table's understructure. Since the table top is always in full view, dirt or extraneous matter can be immediately spotted. The worker, on the other hand, is not concerned with dirt hidden in the table's understructure. Consequently, unsanitary conditions occur in these hidden areas.

In the construction of sanitary stainless steel tables, it must be assumed that the understructure will not receive the same attention as the table top. Therefore, the understructure must be fool-proof so as to minimize the accumulation of dirt, since it is relatively inaccessible to cleaning and is not cleaned as often as the top.

To avoid crevices, all pipe legs and cross braces are welded together and the fillets are ground smooth. Stiffeners for the underside of the table are welded into a separate frame, with closed ends, and the whole unit is then welded to the table.

PICKLES AND CONDIMENTS of all kinds are packed on sanitary stainless steel tables at Bloch & Guggenheimer's L. I. C. plant.



DESIGN OF UNDERSTRUCTURE of the table was important because the understructure is relatively inaccessible to cleaning.

With Many Sanitary Features

include well-rounded corners and an understructure requiring little cleaning

The most outstanding sanitary feature of the table top is the smooth, polished well-rounded corners with a 1-in. radius which facilitates cleaning. Corners with a radius less than 1 in. were not found easy to clean.

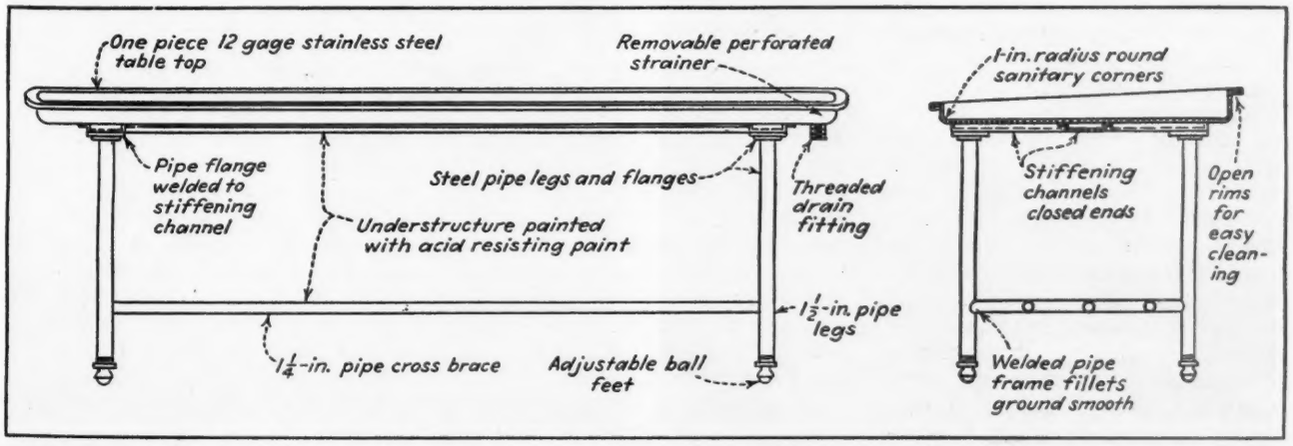
The formed channel section around the top edge of the table has been left open on the underside. Wired or folded edges were not considered. In most cases it is advisable to have a drain with a removable stainless steel strainer in one corner of the table, especially during wet packing operations. The table feet are adjustable so that the table can be pitched toward the drain.

Some of the Design Problems

The original highly polished tables which were located near windows caused intense sunlight reflections. Consequently, the workers developed headaches. Reflection from sunlight was minimized by applying a fine, cross-grained finish to the table top.

A study was made to determine the most advantageous and comfortable position for a foot rest for the workers which would be applicable in most cases. Even the height of the table had to be changed because inspectors developed backaches due to bending over low tables. Raising the working surface of the tables eliminated this difficulty and provided more comfortable working conditions for the packers and inspectors.

Originally developed for packing olives, packers in other fields have found these tables adaptable for their processing. The tables are used for pitting and packing cherries, packing pickles and cucumbers, eviscerating poultry, scaling fish, packing bacon, peeling shrimp, packing dates and cutting turtlemeat for soup. Since some firms pack several products on a seasonal basis, the same tables are used for the different products that are packed by such firms during the course of a year.


One piece 12 gage stainless steel table top
Removable perforated strainer
1-in. radius round sanitary corners
Pipe flange welded to stiffening channel
Steel pipe legs and flanges
Threaded drain fitting
Understructure painted with acid resisting paint
Stiffening channels closed ends
Open rims for easy cleaning
1½-in. pipe legs
1¼-in. pipe cross brace
Adjustable ball feet
Welded pipe frame fillets ground smooth

OUTSTANDING SANITARY FEATURES of the new stainless steel sanitary packing table are the polished, well-rounded corners of the table top, the fabrication of the table's understructure and the elimination of crevices about the pipe legs and cross braces.

1. STERILIZATION of the gravel beds with a solution of sodium hydroxide is the first operation, followed by a water rinse.

2. NUTRIENT SOLUTION is next pumped in a balanced flow from tank in foreground to feeder ditches at far end of beds.

3. DRAINED off, after each of two or three daily feedings, the solution is returned to the tank, seen here in foreground.

4. SEEDING and all other "chores" at the farm are performed by several hundred Japanese. This one is planting radishes.

Hot House Food By the Ton

Japanese occupation forces utilize controlled vegetable raising method

McGraw-Hill World News

PROVISION of fresh vegetables for the American occupation personnel in Japan was one of the first complications to be faced by the Far East Command, immediately after V-J Day. And like most of the other occupation difficulties it was solved by the co-ordination of American investment and ingenuity and Japanese cooperation. The hydroponic farm was the answer in this case.

Established at Chof, Honshu, about 15 miles from Tokio, this "greenhouse" farm has flourished under the immediate direction of the Far East Command. It is now producing at a rate of 10,000,000 lb. of vegetables annually. The greenhouse, seen at the top of the page, covers 232,000 square ft. and is said to be more than twice the size of any other in the world.

From the initial sterilization of the gravel beds to the final washing and packaging of the grown vegetables, the process is carefully controlled.

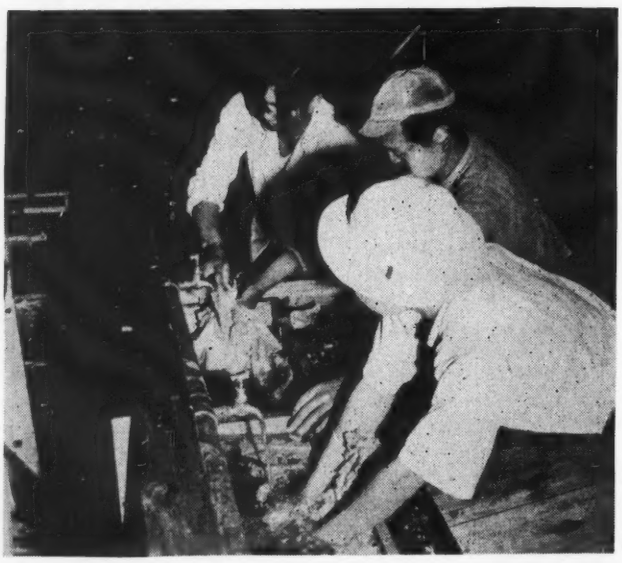
As these pictures illustrate, the nutrient solution is prepared in a tank at the farm. It is composed of water and fertilizer salts along with traces of iron and zinc. Carried by pipelines to feeder ditches at the head of each bed, the excess solution is drained off and carried back to the tank. The solution is fed into the soil two or three times a day. In the meantime, native workers are kept busy seeding, weeding, harvesting, washing and packing the produce. The food is then shipped in chill cars to the various occupation units.

(For pictures of the harvest, turn the page.)

Careful Cultivation Brings the Vegetables to Maturity

5. WEEDING, as every gardener knows, is important though tedious. This lettuce is getting a going-over at the 30-day stage.

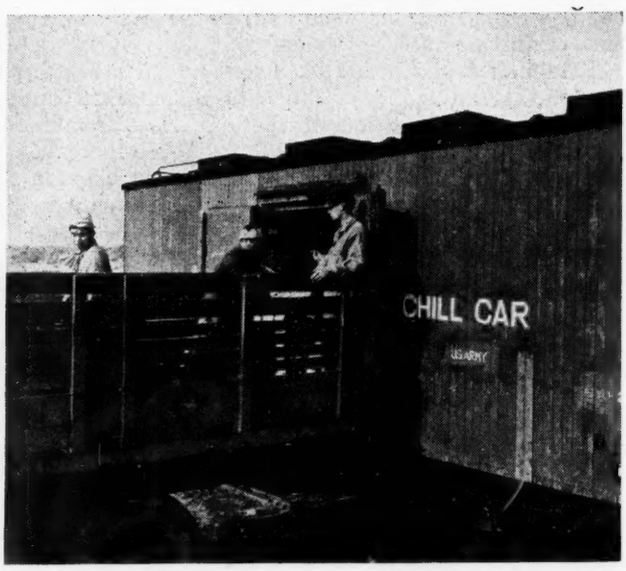
6. CAREFUL ATTENTION is given the crops from seeding right through to harvesting, as this broader view illustrates.



7. AFTER HARVESTING, the hot house vegetables are thoroughly washed in water and then passed along for final rinsing.

8. WEIGHING, as well as the final rinse, was taken care of by the washing crew for the benefit of this picture.

9. PACKING for shipment to units, stationed throughout Japan, keeps the native workers busy during the harvesting season.



10. SHIPPED in the army's own chill cars, the fresh vegetables have proved a definite boon to the Command's personnel.

Business Stays On Top

Survey indicates that food industry executives not only share all-industry confidence that full-scale business activity will continue, but they plan to back this confidence with dollars in expanding to meet greater demands

By PETER FRENCH, McGraw-Hill Department of Economics

THE current business boom should run on through 1948—and with it carry the food industries to new highs of business activity.

These are the main conclusions of a new survey, by the McGraw-Hill Department of Economics, which reports both businessmen's own decisions on the outlook for their businesses and how they are backing those decisions with dollars. Added up, these decisions remove one of the great unknowns in the overall business outlook—business's own spending plans.

This business forecast for the food industries is made by the McGraw-Hill Department of Economics on the basis of personal interviews with hundreds of top executives in scientifically-selected samples of U. S. manufacturing companies. Interviewing was done by trained members of the McGraw-Hill Research Department. The survey, for the first time, measures both businessmen's opinions on key economic questions and the dollars with which they are backing their judgment. In reporting business's own plans for spending in 1948, it shows that capital investment will continue at a high rate through the year, that financing will not be a problem, and that expansion will continue at a high level regardless of wage increases or a decline in business activity.—The Editors.

Food Industry Plans

For the food industries, the survey shows:

1. Sales will be higher in 1948 than in 1947. This is the conclusion of top executives, whose opinions represent 56 percent of the industry. On the average, they see sales going up 15 to 20 percent.

2. Postwar expansion plans are just beyond the half-way mark. About 24 percent of the companies have completed their entire program. On the average, however, companies have finished only 53 percent of their planned new plant and equipment programs. They plan to complete 80 percent of their expansion by the end of 1948.

3. Capital budgets for 1948 total $479,000,000—a decline from the $730,000,000 spent in 1947. However, about 40 percent of the companies have not yet made their plans for 1948. As they do fix budgets, the total may be lifted substantially.

Above Prewar

How the total could change is shown by the fact that the companies that have capital expansion plans for 1948 show a decline in their spending for equipment of only 24 percent. Their budgets for new plants are down 36 percent. The industry's budget, as reported now, includes $234,000,000 for equipment and $245,000,000 for new plants. Even at this level, however, capital expenditures are well over prewar levels. In 1937 they totalled $320,000,000 and in 1940 $294,000,000.

Compares With All Industry

Results of the survey in the food industries roughly parallel reports of all manufacturing companies. Executives of all manufacturing companies combined see sales increasing in 1948 by about 20 percent. They are further along on expansion, having completed, on the average, 64 percent of planned expansion. Their budgets, overall, total $6,100,000,000 as against $7,525,000,000 actually invested in 1947.

Increases in plant and equipment spending planned by utilities and railroads, however, make up half of the decline in manufacturing. Moreover, if capital budgets are stepped up during the year, as they were last year under pressure of competition—and as they are likely to be—overall business spending in 1948 will be less than 10 percent under 1947's record $16,100,000,000. And that is not enough to blight the boom.

With high-level spending by business assured, the last great doubts in the business outlook are removed. Other variables—government expenditures, exports that will be bolstered by the Marshall program, and consumer incomes that will be increased by third-round wage increases and a tax cut—can be forecast fairly well. The boom will run on through 1948 and, since activity in food industries is closely tied to the general economic welfare, they are to have their biggest peacetime year.

Other Indications

Other survey findings for the food industries show:

Only a portion of 1948 program is under contract now. About 25 percent of the companies have none of their program under contract, 43 percent have part of it, and 32 percent have signed for their entire program. By June, 64 percent of the companies expect to have contracted for all the plant and equipment they plan to add in 1948.

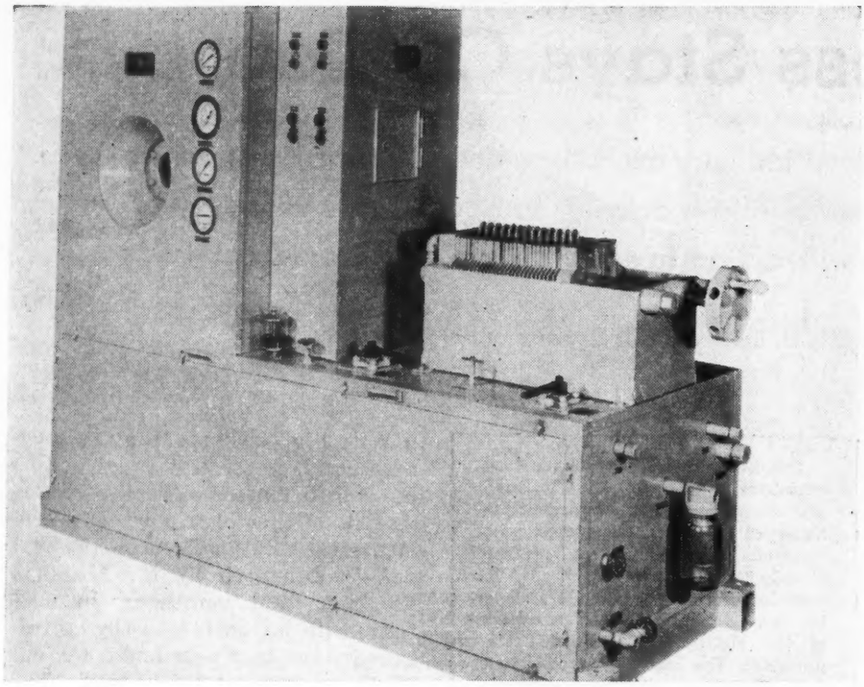
Most of the expansion will be financed internally. Bulk of the money needed—and for 62 percent of the companies, all of it—will come from profits and surplus.

Expansion will go on if wages go up. If wages rise 15 or 20 percent, 17 percent of the companies with plans will increase them, 53 percent will not change them.

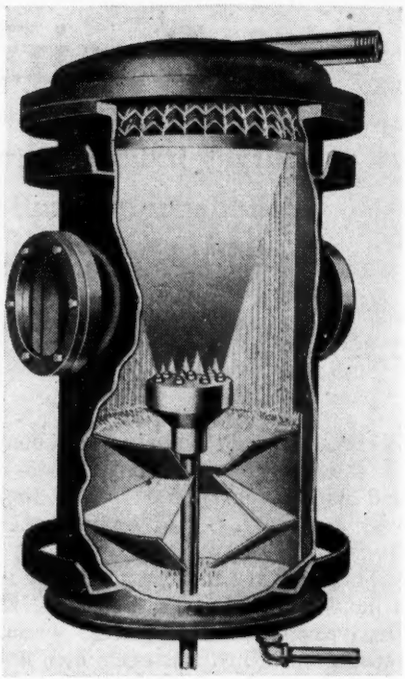
Boom Year

If business drops off 20 percent, 46 percent of the companies will make no change in their plans, only 15 percent will cut their budgets. The 39 percent of the companies who do not have plans did not answer this question.

With businessmen in the food industries—and in all manufacturing—planning to carry through capital programs despite third-round wage increases or a decline in business, the boom will roll on through the entire year.



HYDRO-VOLIFIER consists of an atomizing unit in a vacuum chamber, a vacuum pump and filter press. It will continuously clean and dehydrate oils and de-oil citrus juices.



VACUUM CHAMBER where oil is forced in through jet nozzles at high pressure.

It De-Oils Citrus Juices, Dehumidifies Vegetable Oils

Unit, developed for purification of insulating oils, found suitable for cleaning and dehumidifying edible oils and for treating citrus juices

A VERSATILE piece of equipment having many applications in the food field, such as cleaning and dehydrating vegetable oils continuously and de-oiling, de-aerating and concentrating citrus juices, is now available under the name of Hydro-Volifier.

Used on Insulating Oils

The equipment was originally developed by the Buckeye Laboratories Corp., Cleveland, Ohio, for the purification of insulating oils. After selling hundreds of the units for this purpose, company engineers felt that the Hydro-Volifier had excellent potentialities for dehydrating vegetable oils.

Initial laboratory work confirmed the engineers' belief, and exhaustive tests have proven that the equipment is capable of high efficiency cleaning of any oil having a viscosity up to 100 SSU at 130 deg. F.

While appearing to be a complex machine, the Hydro-Volifier is really very simple to operate. The absence of any moving parts in the basic unit greatly decreases maintenance and operating costs. One attendant can operate either the 100 g.p.h. or the 500 g.p.h. unit with ease. Incidentally, the manufacturer claims these output ratings are based on actual measured flow during the entire time of operation of the units.

Heart of the Unit

Heart of the unit is the patented Buckeye Process which employs a series of atomizing nozzles enclosed within a vacuum chamber. Water and volatiles are removed from the top of the chamber by the vacuum pump. The dehydrated oil flows over a series of baffles in the lower part of the chamber, from which it is removed continuously.

In the Hydro-Volifier, incoming dirty oil is first passed through a pre-filter of mechanical design, which removes all dirt particles of 0.0035 in. diameter or larger. From this filter the oil passes through a high pressure pump and thence to the atomizing jets located inside the vacuum chamber.

As the oil is forcibly ejected from these nozzles, it is fully atomized, forming a fine mist. Because the oil is finely divided, many times the original area is presented to the vacuum, and moisture and volatile impurities vaporize easily.

Impurities Removed

Immediately upon atomization of the oil in the vacuum chamber, the moisture and other impurities are vaporized and drawn off through the top of the chamber to the vacuum pump and discharged to the atmosphere. The clean, dry oil condenses on the top baffle plates and flows over a series of baffles to the

bottom of the tank. It is continuously pumped from the bottom of the tank, while the vaporized impurities are removed continuously from the top.

The oil from the bottom of the vacuum tank is pumped through a filter press which removes the remaining suspended impurities. Because the oil is absolutely dry, the filter press retains a high degree of efficiency, filter paper fibers are not swelled and filtration rate remains constant.

In one pass, all air, dirt, water and volatile corrosives are completely removed, thus permitting continuous operation.

Additional Experiments

Additional experiments in the food field include research in the citrus fruit juice industry, where stainless steel and glass vacuum chambers are used to de-oil, deaerate and concentrate orange, lemon, lime and grapefruit juices, without using high temperatures.

Juices treated by this process are not subjected to high temperatures. This produces a better tasting, more palatable juice. The homogenizing effect resulting from the atomizing nozzles makes the juice more uniform by retarding the separation of suspended matter.

Heat Supply Unit Operates Without Pressure

Completely packaged unit now available for controlled heating in range from 300 to 850 deg. F. Uses non-corrosive salt as heat transfer fluid

HEAT processing within the range of 300 to 850 deg. F., without high working pressures or costly equipment, is possible through the use of a recently introduced "packaged" heat supply unit that utilizes a nitrate-nitrite mixture as a heat transfer medium. This eutectic salt mixture, named Hi-Tec, was formulated by the du Pont Co. It has a melting point slightly under 290 deg. F. and is liquid over a broad range.

The Beth-Tec unit, in which the Hi-Tec is used, is the result of years of designing, developing and testing by engineers of the Bethlehem Foundry & Machine Co., Bethlehem, Pa., in cooperation with the du Pont organization. It has been thoroughly tested and approved in the chemical laboratory of Lehigh University.

Complete Unit

The unit itself consists of a complete furnace, sump tank and submerged salt pump. The furnace comprises the boiler proper, complete with tubes, headers and manifolds for a carefully balanced salt flow. It has adequate combustion space for optimum heating.

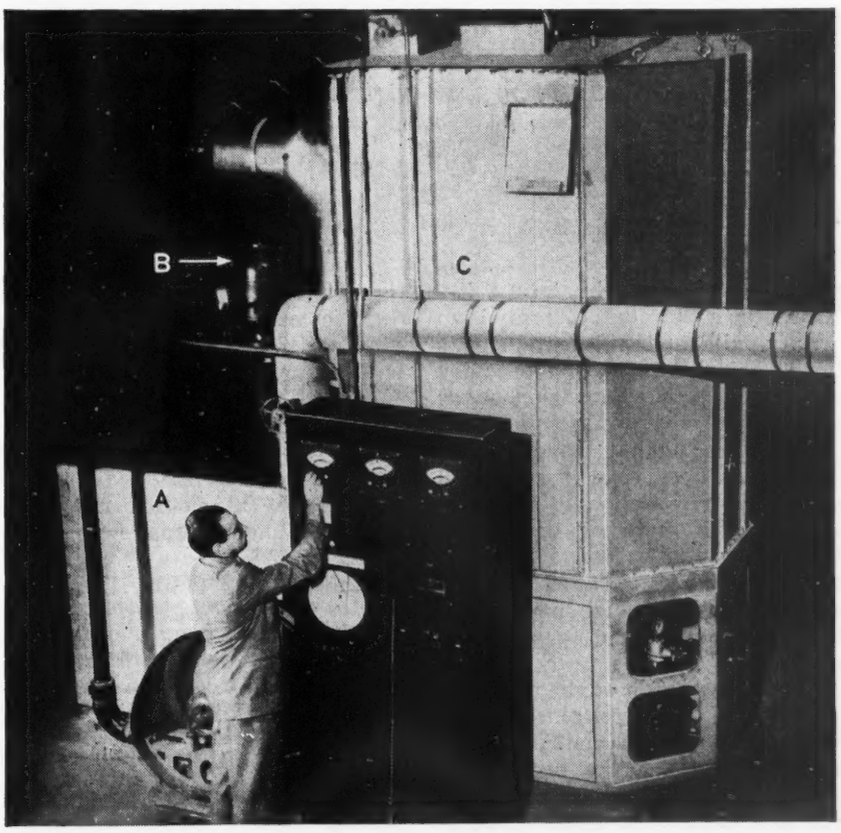
The sump tank is located in the bottom of the unit. In it is either a steam heating coil or an electric immersion heater which melts the salt for the initial operation. The pump for initiating and continuing the flow of melted salt is submerged in the sump. Inspection man-holes are provided to facilitate checking during operation.

At the bottom of the furnace are a highly efficient, proportioning type oil burner and blower. These are equipped with various safety devices such as flame-eye and flame electrodes.

The instrument and control panel is separate from the unit itself. It is complete with all necessary instrumentation and safety controls to provide failure safe operation under all conditions. Interconnected wiring between the control panel and boiler unit is by duct-type cables.

Hi-Tec, the heat transfer medium, has the following properties: (1) Specific gravity—1.97 at 300; 1.68 at 1030 deg. F., (2) specific heat of solid mixture—0.32 B.t.u. per lb. per deg. F.; of the melt, 0.373, (3) latent heat of fusion—approximately 35 B.t.u. per lb., (4) stability at 850 deg. F. or below—excellent, (5) non-corrosive to open-hearth steel at 850 deg. or below.

Units are available from 500,000 to 2,500,000 B.t.u. per hr. in continuous operation.



BETH-TECH heat supply unit consists of molten salt supply sump A; submerged salt pump B; an oil fired water-tube type heater C, and necessary auxiliaries and controls.

PETRI PLATES, showing difference in bacterial flora between milk pail washed in usual manner (left) and one rinsed with alkyl-dimethyl-benzyl-ammonium chloride solution, 220 p.p.m., after washing. Bacterial count was reduced 97.7 percent.

Quaternary Ammonium Compounds In The Dairy Industry

Used in dilutions of 200 to 400 p.p.m. as a spray or rinse for cleaned equipment, certain quaternaries have excellent germicidal properties. They are non-irritating, non-corrosive and will not leave residues on equipment

By JOSEPH J. PORTLEY, Technical Director
Rhodes Chemical Corp., Plainfield, N. J.

ONE of the most important factors in the production of high quality milk and milk products is the chemical sterilization of dairy equipment. Chlorine compounds have served fairly well for this purpose, although they have certain limitations. Because of these limited properties, research was instituted with a new class of compounds known as quaternary ammonium compounds, or cationic wetting agents, some of which have excellent germicidal and deodorizing properties.

The killing power of the new compounds was first determined by the Food & Drug Administration test method, in which the test microorganisms, *Staphylococcus aureus* and *Eberthella typhosa* are used as an official standard of resistance. Bacteriologists reported that quaternary ammonium salts, with a definite molecular structure*, have excellent killing power as compared with phenol.**

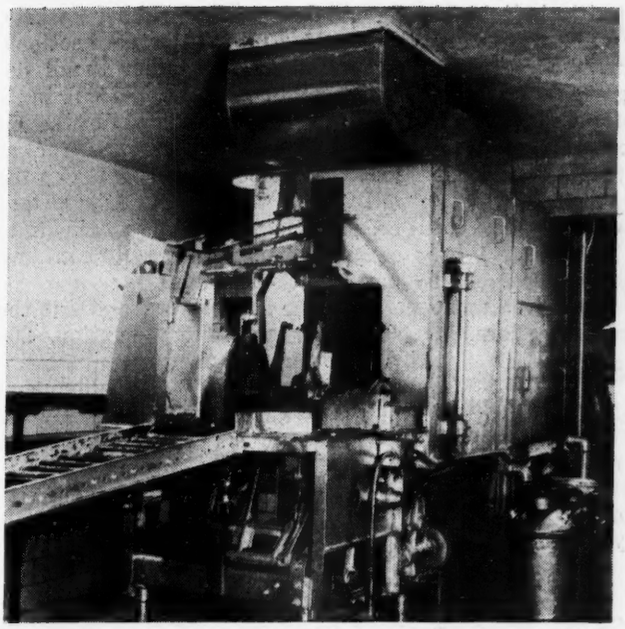
Field Evaluations

After the killing powers of these new compounds had been proved with the F&DA method, they were evaluated under actual field conditions.

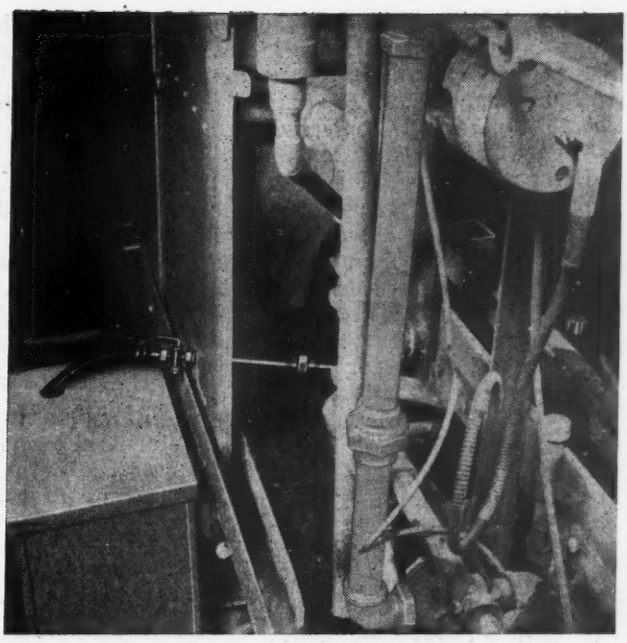
Jamieson and Chan[2], University of Manitoba, Winnipeg, Can., were among the first to show the effectiveness of cationic wetting agents in the control of bacteria associated with the dairy industry. Forty-quart milk cans were washed in alkaline cleaning solution, dried and held about 15 hours before taking swabs for testing. Fifteen minutes before filling with milk, the cans were sprayed with a solution containing 800 p.p.m. quaternary ammonium compound. Immediately after spraying, swab samples were taken. After testing 96 cans for a period of one week, a cationic agent, designated as Sanitizing Agent II, reduced the average bacterial count of milk cans from 912,916 to 143 or 99.98 percent. Moreover, these investigators reported the treatment of 98 cans with another quaternary salt, marked Sanitizing

*According to Domagk, bactericidal properties are found in all compounds having one long fatty acid chain—C_8H_{17} to $C_{18}H_{37}$—and three short alkyl radicals, one of which may be a benzyl group, which are attached to the nitrogen atom forming the cation. Furthermore, the nitrogen atom has a halide bonded to it.

**Published laboratory data regarding the germicidal efficiency of cationic wetting agents are too voluminous to present here. It may be indicated, however, that the published data show the quaternary salts to have from 30 to 500 times the killing power of the phenol standard.



MILK CANS are sterilized by spraying with a quaternary ammonium solution between final rinse and hot air blast in the washer.



SPRAY JET, for sterilizing milk cans in straightaway can washer. Supply tank for quaternary solution is shown at left.

Agent III, resulting in an average reduction of bacteria from 596,158 to 401 or 99.93 percent.

Jamieson and Chan's report is important to dairymen because improperly cleaned and sanitized milk cans constitute one of the worst sources of milk contamination.

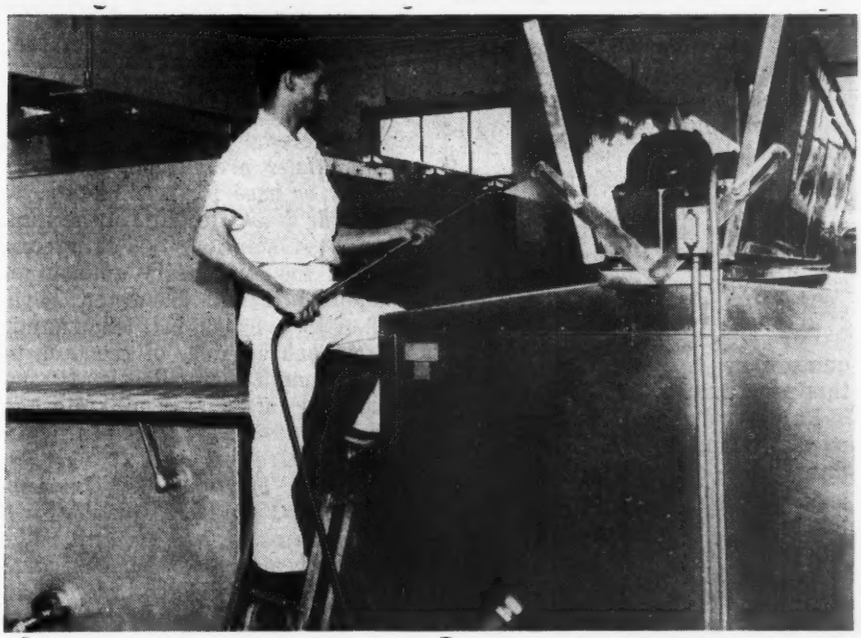
In University of Vermont Experiment Station Bulletin 511, Frayer[3] reported testing a cationic agent on three different species of microorganisms associated with the milk supply. Laboratory data are presented showing 100 percent kill of *A. aerogenes, E. coli and B. subtilis* with a 200 p.p.m. solution of a cationic agent with a contact period of 3 minutes.

Unpublished Findings

Mueller, dairy research professor at the University of Massachusetts, in unpublished findings indicated that alkyl-dimethyl-benzyl-ammonium chloride* is highly effective for controlling bacteria associated with milk processing equipment.

The first part of Mueller's research was confined to 40-qt. milk cans in a pasteurizing plant handling 25,000 qt. of milk daily. Twenty cans selected at random were followed through the straightaway can washer daily until approximately 470 cans had been tested. Of the 20 cans, 10 were washed, then subjected to live steam for 8 sec. followed by a hot air blast. The remaining 10 cans were treated similarly, except that the steam contained 200 p.p.m. of the quaternary ammonium compound.

*This compound is known by the trade names of Rodalon and Roccal.



STORAGE TANKS may be sanitized by spraying with quaternary solutions after washing.

Using the American Public Health Association standard method of analysis, in which 100 c.c. buffered salt solution is used for rinsing the cans, a sample of approximately 15 c.c. of the wash water was taken from each can and placed in a sterile bottle, then iced and taken to the laboratory for analysis.

Samples from cans treated with the quaternary ammonium compound, taken within 5 min. after leaving the washer, showed a 52 percent bacterial reduction as compared with the untreated cans. This 52 percent reduction is illuminating because it proves that cans treated with steam for 8 sec. are not properly sterilized.

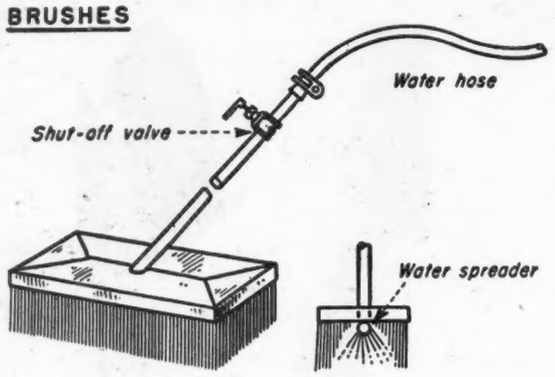
Second Phase

The second phase of Mueller's investigation was identical with the first, except that the bacteriological samples were taken 24 hr. after the cans were run through the washer. This procedure was adopted because it would simulate the condition under which the dairy farmer would receive the cans.

Samples of treated cans, taken after standing for 24 hr. on the platform, showed 96 percent bacterial reduction as compared with the untreated cans. This high bacterial kill in milk cans is an excellent illustration of the effectiveness of the quaternary ammonium compound as a germicidal agent.

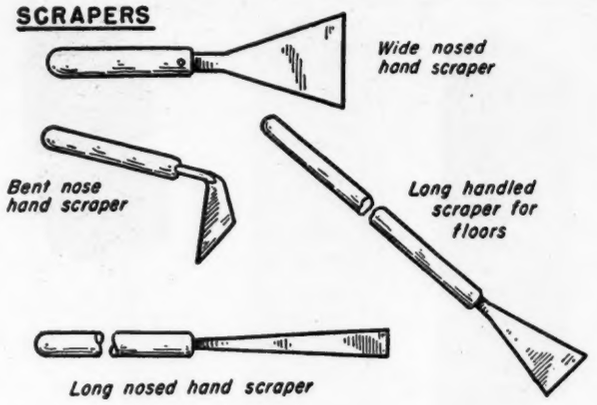
Brushes, Scrapers and Hose Nozzles of Proper Design Facilitate Plant Clean-Up

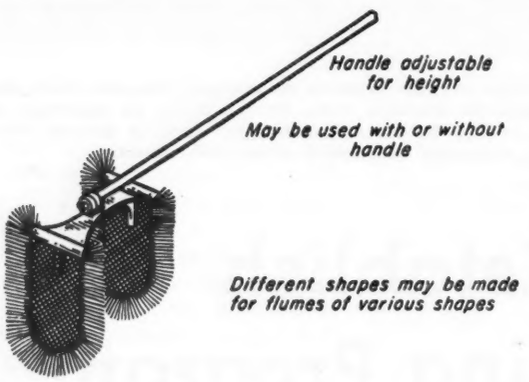
BRUSHES



Brush with water spreader in bristles
Uses - Cleaning screens, rotating size graders, floors, belts, etc.

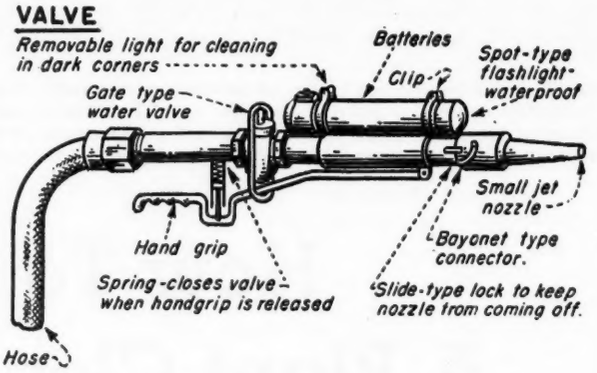
SCRAPERS



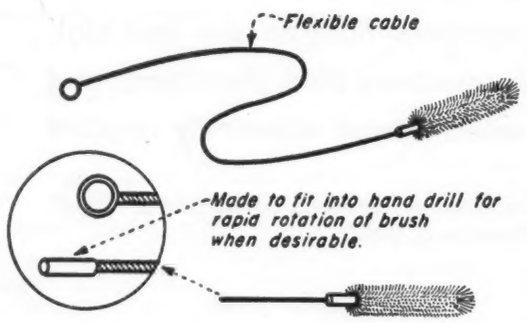

Handle adjustable for height
May be used with or without handle
Different shapes may be made for flumes of various shapes

Flume brush - made to fit contour of flume.

VALVE

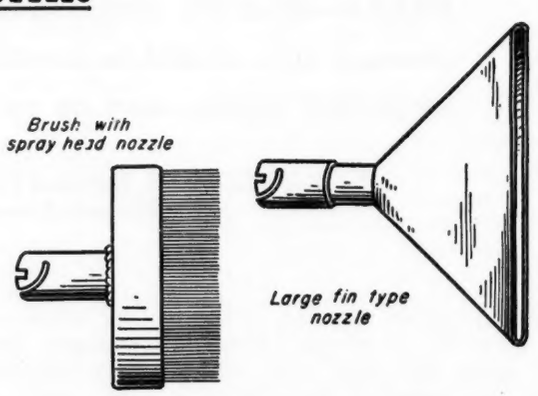


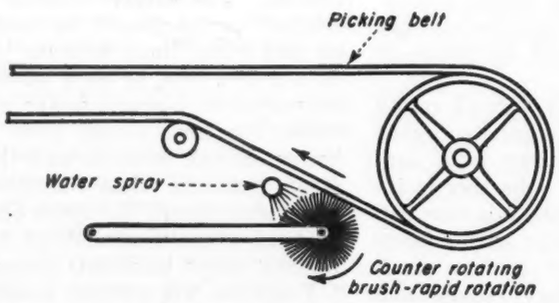
NOTE: This diagram merely suggests an idea to follow in designing a valve.



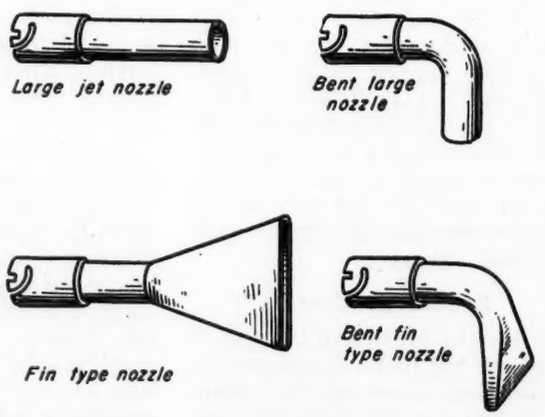
Pipe brushes - used for cleaning pipe and pipe fittings

NOZZLES

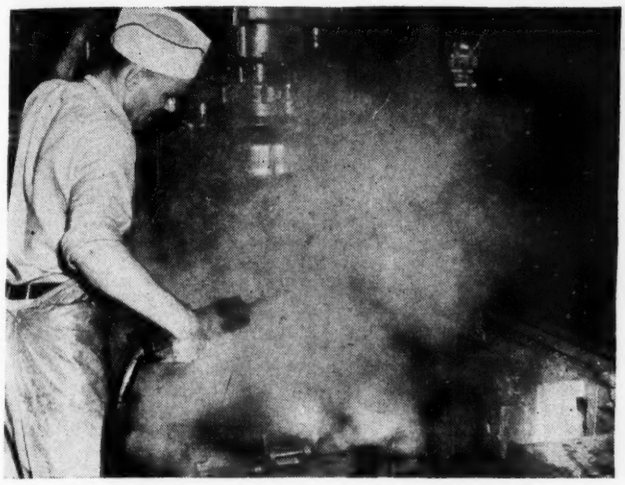




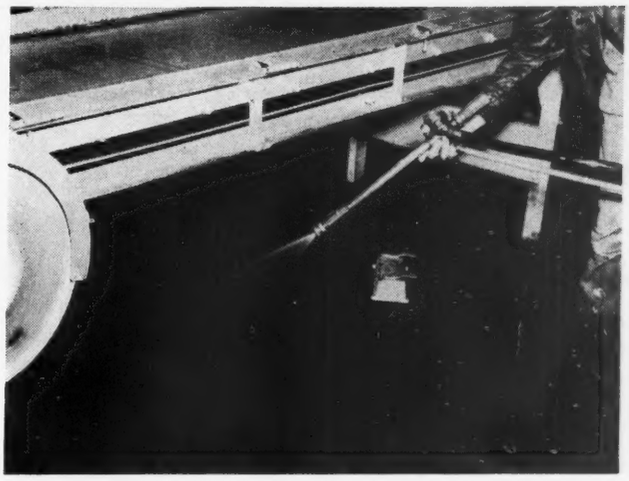
Counter rotating brush to be engaged during clean-up



High Pressure Equipment and Steam Are Used to Remove Slime and Other Deposits



STEAM is less efficient than water for removing debris from equipment because the operator is unable to see his accomplishments.



HIGH PRESSURE water sprays, operating at pressures from 200 to 400 psi., easily remove tenacious deposits and save cleaning time.

High Pressure Equipment

The establishment of physical cleanliness requires the elimination of slime and other deposits from all surfaces. To accomplish this, special cleaning aids such as high pressure equipment are often employed. Because of the ease with which they remove tenacious deposits and save time in cleaning, the high pressure units have met with considerable success.

Pump-type high pressure units are being used by a number of canneries. These units are capable of producing pressures as high as 800 psi. or higher, although their normal operating range is 200 to 400 psi. Stationary units are usually placed in the pump room with the high pressure water piped throughout the plant, while the portable units are mounted on wheels. The relative merits of portable versus stationary depend on the type of cannery. For example, a portable unit may prove unhandy if it has to be taken from floor to floor or from area to area. In this case a stationary unit would be more adaptable. For a one story plant, with plenty of room around the equipment, the portable units are very satisfactory. Cost of the stationary installation is usually greater than for the portable unit.

Several types of high pressure units are available that apply hot water under pressure. These units are particularly adaptable for cleaning jobs where hot water will remove certain adherent deposits more effectively than cold water. One type creates high pressure hot water by pumping cold water through heating coils, while others heat the water by mixing it with steam. In this group are such units as steam guns or solution lifting guns. One unique piece of equipment of this type jets water and steam through a Venturi tube and ends up with a jet pressure twice that of the steam pressure.

High pressure steam as a cleaning aid can be used to blow off considerable debris. It is much less efficient than water, however, because the operator is unable to see his accomplishments due to the resulting fog.

Operation

High pressure equipment must be handled with caution if desired results are to be obtained. Care should be taken to avoid injury to the equipment and operators, because water under a pressure of 400 psi., if discharged in large volumes, has a high cutting force. Painted and other delicate surfaces may be injured, and thin sheet metal equipment may be permanently bent by such force. The operator could be badly injured if hit by a stream of high pressure water. When a large volume high pressure hose is being used, the nozzle should have a trigger release to turn off the water, and the operator should be provided with waterproof clothing. It is also desirable, for ease in handling and safety, to have short hose extensions. All hoses used for carrying high pressure water or steam should be pressure tested.

When high pressure water is used, both volume and pressure are important and must be considered when buying equipment. High pressure may clean effectively but too slowly for efficiency if the volume output is low.

Most of the high pressure units have an added advantage in that they are equipped to apply detergents with the water.

Brushes are handy for many cleaning jobs and can be used satisfactorily for removing slime and other deposits. They should be selected and purchased according to their adequacy for the job intended. The brush should be of proper shape to fit the area being cleaned and should have a handle long enough to reach the job without discomfort to the operator.

Brushes can usually be employed to good advantage with detergent solutions for removing deposits. If used in this way they should be made of materials that are not harmed by the detergent solution. For example, wire brushes are corroded by acids and strong alkali, while fiber brushes are more resistant; brushes with glued-in bristles may lose the bristles rapidly if used in a detergent with high wetting ability due to the wetting agent dissolving the glue.

The surface being cleaned is a determining factor in the type of brush to be used, because harsh brushes may injure delicate surfaces.

Detergents

Detergents are chemicals which, when added to water, increase its power to clean. The efficiency of a detergent depends on its ability to dissolve or suspend the contaminating materials so they can be washed away. These suspending or dissolving powers are determined by one or more of at least six principal properties: Wetting power, emulsifying power, deflocculating power, dissolving power, neutralizing power and protective power.

The wetting power of a detergent

Table of Cleaning Recommendations

MATERIAL TO BE REMOVED

Starch dried on	Starch and other materials burned on	Acid organic deposits	Alkaline organic deposits	Do not use on surface indicated	Surface
1c, 2*, h, 2g, d, c, 8, 2fd	1c, 2*, h, 2g, d, c, 8, 2fd	1c, 2, h, d, 2g, 8	1, 3 + b + 2, c, 8	3, 4	Steel and iron
2, 2g, d, 2fdc, 8	2, 2g, d, 2fdc, 8	2, 2fdc, 8	3 + b + 2, c, 8	1, 3, 4, i, 4b	Galvanized
1, 2, d, 2fd, g + c 2a, 1a, 2h, 8	1, 2, d, 2fd, g + c 2a, 1a, 2h, 8	1, 2, d, 2fd, g + c 2a, 1a, 2h, 8	3b or 4bc, 8		Stainless steel
2 or 2— + a, 3bc, d, 8	2 or 2— + a, 3bc, d, 8	2 or 2— + a, 3bc, d, 8	3 + b + c + 2, 8	1, 4, 3, i, 4b	Copper-alloy and copper
2bcm, d—, 8c	2bcm, d—, 8c	2bcm, d—, 8c	3 + b + c + 2, 8c	1, 3, 4, i	Tin or tinned surface
2—bch, 8c	2—bch, 8c	2—bch	3 + b + c + 7	1, 4 i	Aluminum
2h, 2fdc, 8c	2h, 2fdc, 8c	2h, 2fdc, 8c	3 + b + 2 + 7	1 a	Wood, unpainted
2—c, 2W, k, d—		2—c, 2W, k, d—	3 + b + 2—, 2—W	1, 4 i	Paint
1, 2, 5, 2W, 1g, 1a, 8		1, 2, 5, 2W, 1g, 1a, 8	1, 3 + b + c + 2, 8	3, 4	Concrete
2f, h, 2W, 8		2f, h, 2W, 8	3 + b + c + 2, 8	4, 5, 4b i	Rubber and rubber belting
2, c, d, 2W, f, 8		2, c, d, 2W, f, 8	3 + b + 7	1, 3, 4, i	Fabrics and fabric belting
2—, c, e*	*	2—, c, e*	3 + b + c + 2—*	1, 4, d i *	Plastics
2, 3, a, d, g, h, 8	2, 3, a, d, g, h	2, a, d, g, h, 8	3b or 4b + 7	1, i	Glass and glass lined

MATERIAL TO BE REMOVED

Inorganic deposits (Ca & Mg scales)	Sirup	Brine	Grease Oil Fat	Metal oxide	Slime and mold	Do not use on surface indicated	Surface
3 + b + 2 4 + b + 2	7, 8, 2—W, a, d	7, 8, 2—W, a, d	1c, 2, f, 2W, a, d, g	3 + b + h + 7	2, 6, a, 8, 2g	3, 4	Steel and iron
3 + b + c + 2	7, 8, 2—W, a, d	7, 8, 2—W, a, d	2W, a, d, f, g	3 + b + h + c + 7	2, 6, 8 a, 2g	1, 3, 4, i, 4b	Galvanized
3b, 4bc	7, 8, 2—W, a, d	7, 8, 2—W, a, d	1c, 2, a, 2W, a, d, f, g	3 + b + h + 7	2, 6, 8 a, 2g		Stainless steel
3 + b + c + 2	7, 8, 2—W, a, d	7, 8, 2—W, a, d	2W, d, a, f, g	3 + b + h + c + 7	2, 6, 8, 2g	1, 4, 3, i, 4b	Copper-alloy and copper
3 + b + c + 2	7, 8, 2—W, a, d	7, 8, 2—W, a, d	2W, a, d, f, g, c	3 + b + h + c + 7	2, 6, 8c, 2gc	1, 3, 4, i	Tin or tinned surface
3 + b + c + 7	7, 8, 2—W, a, d	7, 8, 2—W, a, d	2—W, a, d, f, g, c	3 + b + h + c + 7	2—, 6, 8c, 2—gc	1, 4, i	Aluminum
3 + b + 2 + 7	7, 8, 2—W, d	7, 8, 2—W, d	1c, 2, 2—W, d, f, g	3 + b + h + 7	2, 6, 8, 2g	1, a	Wood unpainted
3 + b + 2	7, 8, 2—W, d—	7, 8, 2—W, d—	2—W, d—, k	3 + b + c + k + 7 2—W	2—, 6, 8c, 2gc	1, 4, i	Paint
3 + b + c + 2	7, 8, 2—W, d	7, 8, 2—W, d	1c, 2, dfg, 2W	3 + b + c + h + 7	2, 6, 8, 2g	3, 4	Concrete
3 + b + c + 2	7, 8, 2—W, d	7, 8, 2—W, d	2W, d—, gf	3 + b + c + h + 7	2, 6, 8, 2g	4, 5, 4b, i	Rubber and rubber belting
3 + b + 7	7, 8, 2—W, a, d	7, 8, 2—W, a, d	2W, a, d, f, g	3 + b + h + 7	2, 6, 8c, 2g, a	1, 3, 4, i	Fabrics and fabric belting
3 + b + c + 2—*	7, 8, 2—W *	7, 8, 2—W *	2—W *	3 + b + c + 2— + 7*	2—, c, e *	1, 4, i, d, *	Plastics
3b, 4b + 7	7, 8, 2—W, a, d	7, 8, 2—W, a, d	2Wa, 2a, d, f, g, h	3 + b + h + 7	2, 6, 8, a, 2g	1, i	Glass and glass lined

This table merely suggests some starting points, and experience may indicate other cleaning methods to be necessary.

KEY

What to Use

1. Highly alkaline detergents
2. Moderately alkaline detergents

2W. Neutral or moderate alkaline + wetting agent

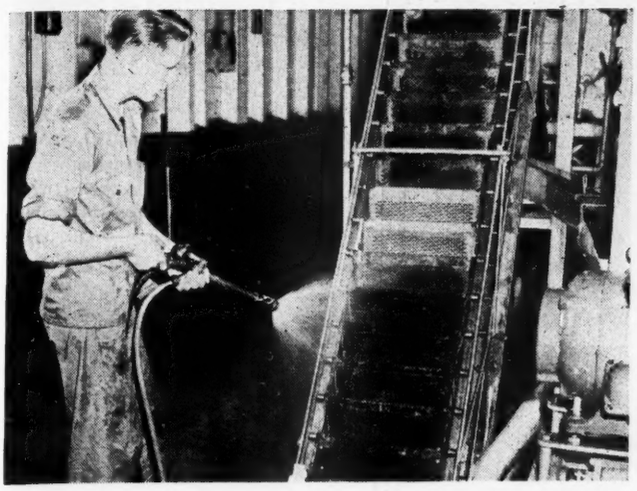
3. Moderately acid detergents
4. Strong acid detergents
5. Organic solvent
6. Germicidal agent
7. Water
8. High pressure water

* = Stronger — = Weaker • = Consult manufacturer

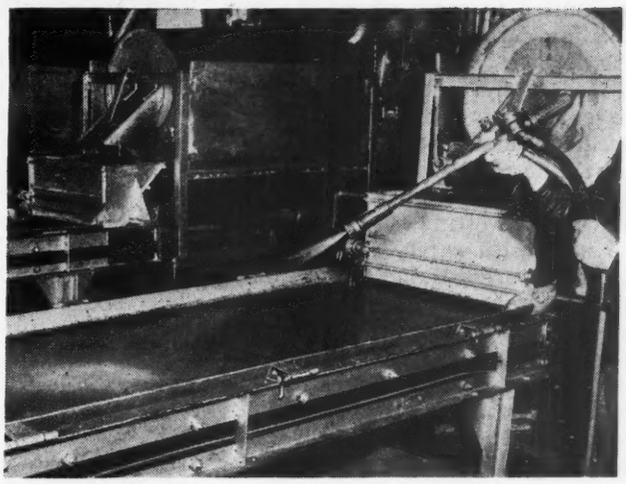
How to Apply It

a. Agitated boil
b. Inhibitor
c. Proceed slowly
d. Heat
e. Cold
f. Pressure
g. Steam gun
h. Fiber brushes
i. Wire brushes or sponges
j. Cost high
k. Sponges
m. Low concentration

Equipment May Be Sprayed With Solutions of a Detergent or Bactericide



GERMICIDES are applied after physical cleanliness is complete. picture shows clean-up man spraying bucket elevator.



DETERGENTS may be sprayed or sprinkled onto equipment and brushed around, then washed off with an excess of clean water.

depends on its ability to lower the surface tension, or in other words, to increase the penetration or spreadability of the water films. Many detergent materials will tend to affect the surface tension somewhat; this property is obtained principally by adding wetting agents.

Emulsification of Oils

Emulsification is the physical phenomenon whereby an oil is suspended in water, and it is by this action that many oils are removed from equipment surfaces. The principle involved is that the molecules of the emulsifying agent are composed of two parts—one soluble in water and the other soluble in oil. When oil is emulsified this agent surrounds the oil droplets with the oil soluble ends immersed in the oil and the water soluble ends sticking out so the oil droplet can be suspended in the water and washed away. Soaps and many of the new wetting agents are good emulsifiers.

By deflocculation is meant the breaking up of large particles into smaller ones, and most of the detergent materials such as silicates, phosphates and carbonates have this power if used in low concentrations.

The ability of a detergent to dissolve "soils" on equipment is often largely a question of acidity or alkalinity. Alkaline deposits can be dissolved by treatment with acids, and acid deposits can be dissolved with alkalis. Closely related to this is the property of neutralization. For example, fruit acids can be neutralized by alkalis; fatty acids and animal or vegetable oils can be saponified (neutralized) by alkaline detergents to create water soluble soaps that are readily washed away.

The protective action of a detergent is considered in two ways: First, protection against contamination of equipment by precipitation of insoluble material from the cleaning solutions, and second, protection against etching or corrosion of surfaces by the active material in the cleaning agent.

Precipitates will usually be left on machinery after cleaning if there is any tendency for a combination of the "soil," the detergent, and the mineral content of the water to form insoluble residues of an adherent nature. Most of the alkaline detergents will precipitate calcium and magnesium from hard water, and when vegetable or animal oils are present, insoluble calcium soaps (scums) are formed. Thus the ideal detergent should have the property of preventing, in alkaline solutions, the formation of insoluble deposits. Calcium and magnesium precipitates can be prevented by adding to the detergent material one of the phosphates, such as sodium hexa-metaphosphate or sodium pyrophosphate. These materials form soluble compounds with calcium and magnesium and prevent their being deposited.

Protective Action

Many surfaces are readily corroded by alkalis and acids. The amount of corrosion depends on the strength of the detergent, the type of metal, and the extent to which the detergent is inhibited. Inhibitors are used in most highly acid or highly alkaline detergents because they allow the cleaning action to proceed undisturbed without the surface being harmed. Most of the inhibitors are trade secrets and can only be purchased from detergent manufacturers. It is known, however, that strong alkalis are inhibited by silicates and the alkaline detergents which are most corrosive to aluminum and iron are those which do not contain this compound. Likewise, dichromates have been found to be effective in preventing corrosion of metals by acids.

Classification and Uses

A great many detergents are available and are known principally by trade names. The number of different ones to be used in a cannery should be kept to a minimum to avoid confusion and misuse. For the average plant two or possibly three cleaning agents will suffice.

Detergents can be classified into five main groups, namely: Highly alkaline, moderately alkaline, neutral, moderately acid, and strongly acid. See Table I.

The highly alkaline detergents contain large percentages of caustic soda (lye), which is one of the cheapest cleaning agents. They will remove most deposits and are especially good for removing fats, oils, and dried-on or burned-on material. They have the disadvantage that they are corrosive or harmful to such surfaces as iron, tin, aluminum, oil base paints, wood and fabrics, and cannot be used in many places for this reason. The addition of a silicate helps to inhibit this action. Strong alkalis will readily deposit calcium and magnesium from hard water unless inhibited with a phosphate. They are not harmful to rubber or concrete and can be used rather freely on such surfaces. They are too corrosive in their ac-

tion to be used extensively in canneries; therefore, their use should be limited to cases where the less alkaline detergents fail to remove the deposit.

Moderately alkaline detergents have as their principal active ingredient one or more of the following: Phosphates, silicates or carbonates, and to some is also added an organic wetting agent. They can be used with safety on most surfaces and are satisfactory for many cleaning jobs. If an operator were selecting a detergent to be used for over-all general purpose cleaning, he would probably choose one of these. Certain of these compounds may need the addition of an agent to inhibit precipitation of calcium and magnesium, and if used in high concentrations they may be corrosive to aluminum, tin and iron surfaces.

The neutral detergents are composed of some neutral chemical such as a phosphate, and an organic wetting agent. Because of their neutral action they are not corrosive and have about the same cleaning efficiency as some of the moderately alkaline detergents. In addition they have a good wetting power. They are especially good for cleaning delicate surfaces.

Moderately acid cleaners usually contain one or more of the weak acids such as gluconic, acetic, citric or phosphoric acid. They are satisfactory for removing organic mineral deposits such as calcium oxalate, and are good for dissolving inorganic scale deposited on equipment from hard water. They are only moderately corrosive to most metals and can be used without danger if inhibited, and applied for a short contact time.

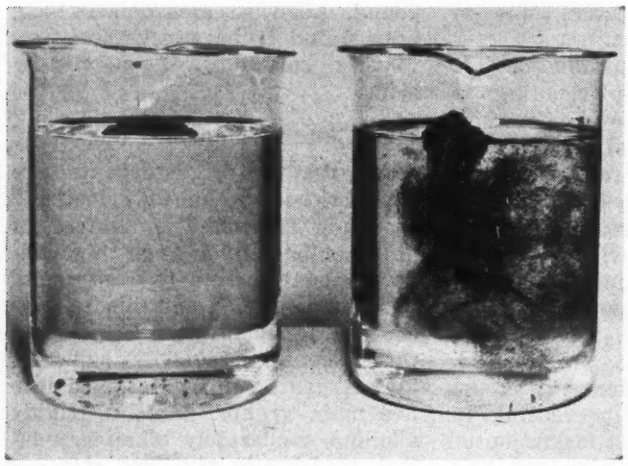
Strong acid cleaners usually contain hydrochloric (muriatic) or sulphuric acid as their active ingredient. They are rarely used in canneries because of their corrosiveness. In the hands of an expert, however, with a good inhibitor and a short contact time, they can be used for removing heavy scales or inorganic deposits.

The way in which a detergent is applied often determines the success or failure of a cleaning job. They are generally more efficient when applied hot and under pressure, and the speed of cleaning is increased if the surface is brushed while the detergent action is taking place. When brushing is part of the cleaning operation, the detergent may be sprinkled (dry) or sprayed on, and then brushed around, or it may be applied by dipping the brush into a bucket of the solution. An ideal arrangement is to have a brush on the end of a steam or solution lifting gun, equipped with a spray head running between the bristles so that simultaneous application of detergent with brushing results.

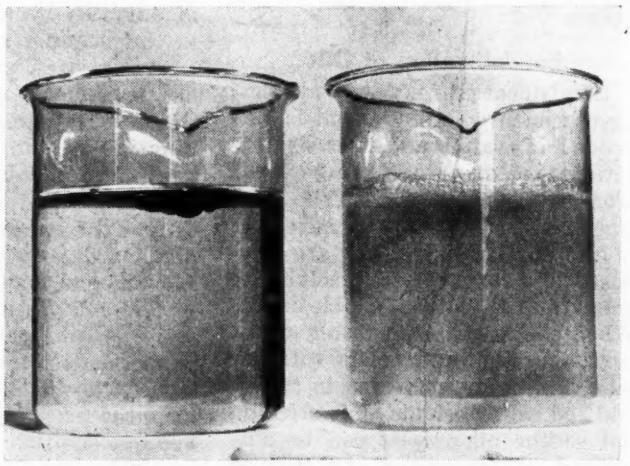
Soaking is another good method of applying a detergent. This can be done either by filling the machine with solution and letting it soak, by pumping the solution through the lines, or by dismantling equipment and allowing it to soak in a tank of the cleaning solution.

When detergents are being applied, excessive contact time should be avoided, and after the cleaning job is finished all the detergent

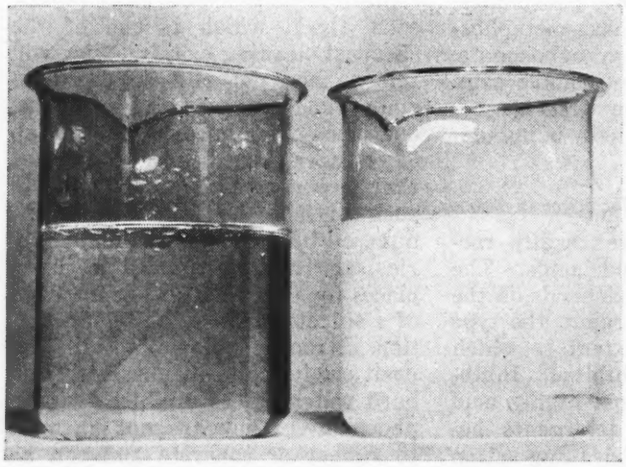
(*Continued on page* 230)



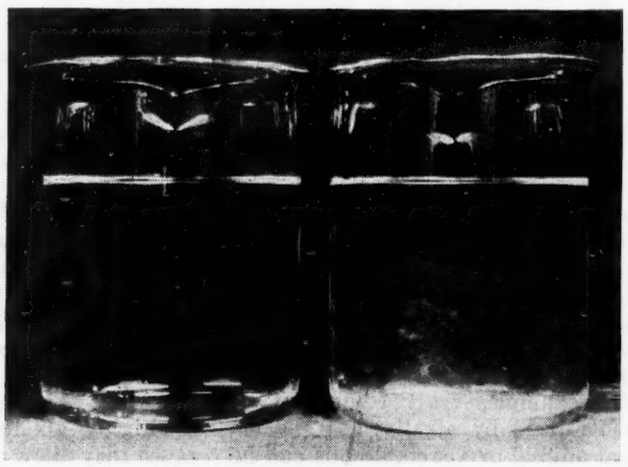
WETTING AGENTS are added to detergents to increase spreadability of the water films. Photo (right): action on carbon block.



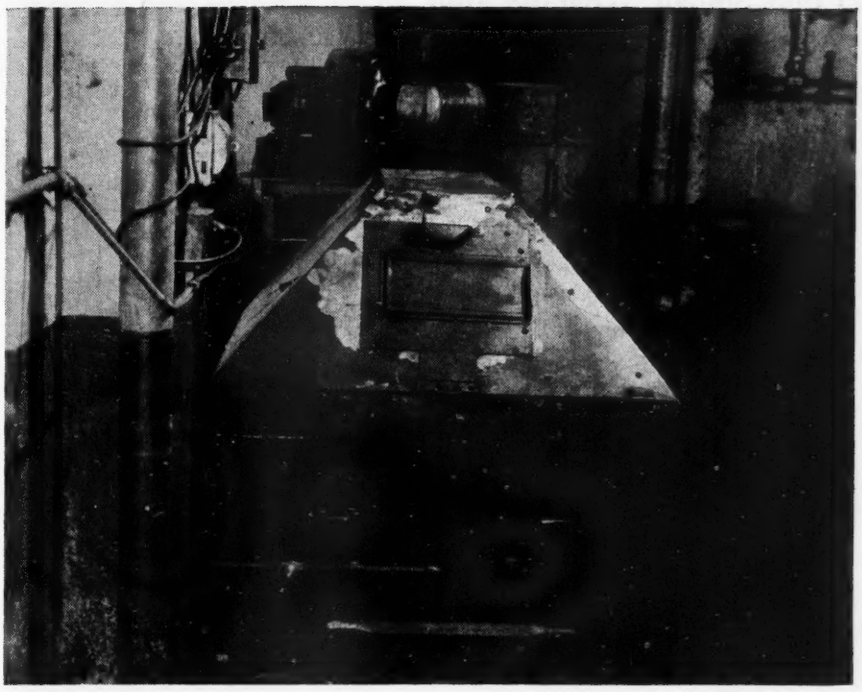
EMULSIFICATION removes oil from equipment surfaces. Photo (right) shows effect of emulsifying agent on mineral oil in water.



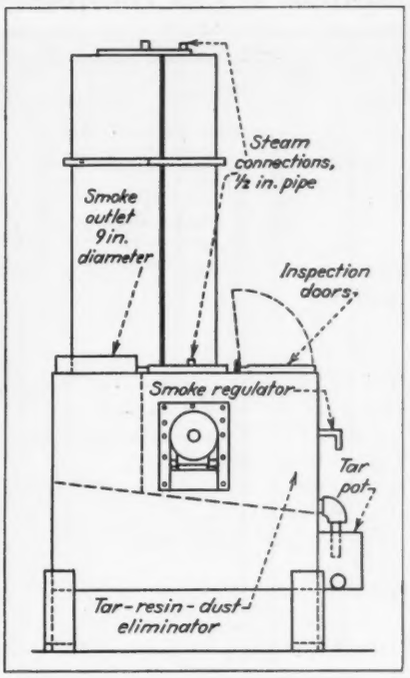
SAPONIFICATION of fats by alkaline detergents creates water soluble soaps. Photo (right) shows saponification of vegetable oil.



PRECIPITATION of insoluble Ca and Mg residues by alkalis can be prevented (beaker at left) by the addition of a phosphate.



COMBINATION smoke generating and washing unit was first built and installed for the fully automatic smokehouse in use by H. C. Bohack Co., Inc., Brooklyn, New York.



SMOKE regulator, resin eliminator and smoke outlet in the Lipton smoke unit.

Smoke Washing Unit Improves Meat Quality

Unit generates, washes and delivers smoke evenly throughout smokehouses, producing smoked products of uniform quality, with a reduction in shrinkage

SMOKE can now be washed and distributed evenly throughout smokehouses where hams, bacons, sausage products, fish and cheese are more uniformly smoked, by a smoke unit developed by M. H. Lipton, president of M. H. Lipton Co., Inc., New York City. The smoke unit, located outside of the smokehouse, generates, washes and delivers smoke to one or several houses at the same time, at the rate of 500 cu. ft. per min.

Advantages

The smoke unit stabilizes the smoke temperature. Some packers with Lipton smoke unit installations claim that the use of clean, washed smoke is a decided advantage from a standpoint of quality smoked products. Smoked meats, they say, are uniform in quality, without streaks or spots. Smoked flavors are not bitter and the meat has a desirable color and bloom. Other users claim that there is a reduction in the shrinkage of ham and bacon and that products also stand up well. No change in the appearance of smoked meats takes place, even after several days in the cooler.

Tar, soot, resin, ashes, dust and sparks (likely to create a fire hazard), are removed from the smoke during washing without at the same time removing desirable smoke substances or affecting their functions.

Although some questions have arisen on whether any desirable constituents are removed from the smoke, chemical tests have shown the Lipton conditioner removes few of the antiseptic substances, since smoke samples taken from the smokehouse with the unit operating vary but slightly in composition from samples secured with the conditioner idle.

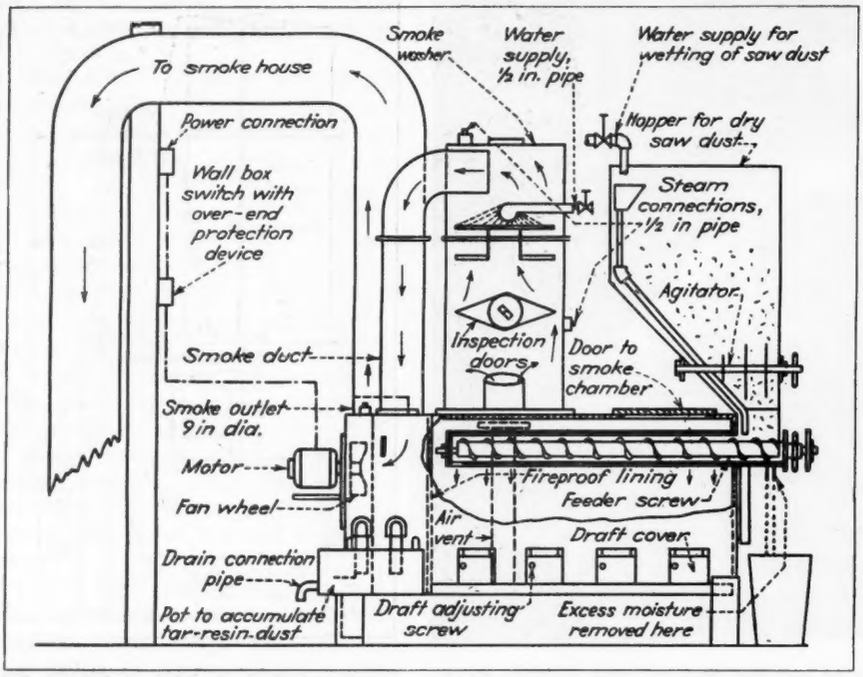
Cost of sawdust is cut in half because it burns more economically. At the same time the smokehouse is cleaner than with other smoking operations, reducing man-hours spent in cleaning. Use of washed smoke, however, will not eliminate washing entirely, since grease from products comes in contact with walls, doors, trees and steam coils.

Sawdust Feeder

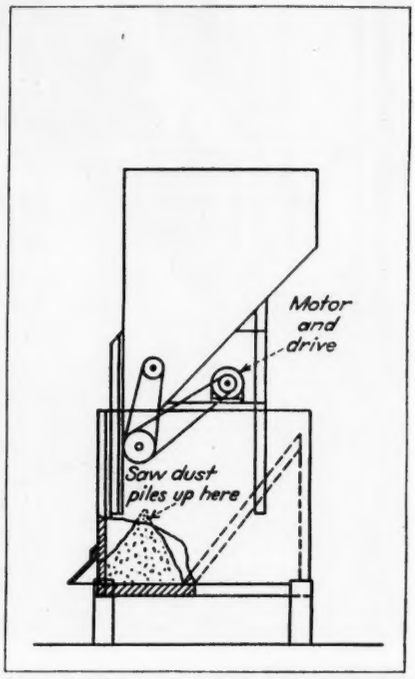
The sawdust feeder, with the automatic screw feed, eliminates the frequent attention otherwise required. It also increases the capacity of the smoke unit because it produces a constant volume of dense smoke.

The feeder allows the smoke unit to take care of an additional smokehouse. It eliminates all labor except that required to fill the sawdust hopper, once each eight-hour shift.

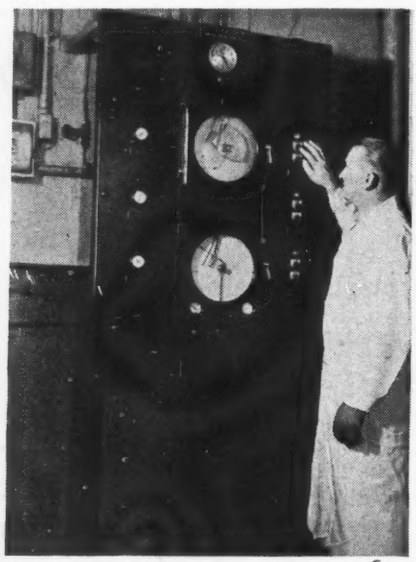
Sawdust Is Fed Automatically into Smoke Washing Unit.



CENTRIFUGAL washer removes tars, resins, ashes and soot and distributes the smoke from the unit to one or several smokehouses at the rate of 500 cu. ft. per min.



AUTOMATIC feeder distributes sawdust and frees the operator for other work.



SMOKEHOUSE control unit and temperature recorder at H. C. Bohack Co.'s meat plant.

HAMS, smoked with washed smoke, are uniform in quality, without streaks or spots.

POT shows the accumulation of tars and resins that were washed from the smoke.

Smoke is commonly produced in a fire pit in the lower story of the smokehouse, equipped with a gas burner over which damp sawdust is placed. Usually there are a series of smokestacks in the roof of this type of a smokehouse. These stacks are provided with dampers to permit the smokehouse operator to get an even draft and distribution of smoke around the products.

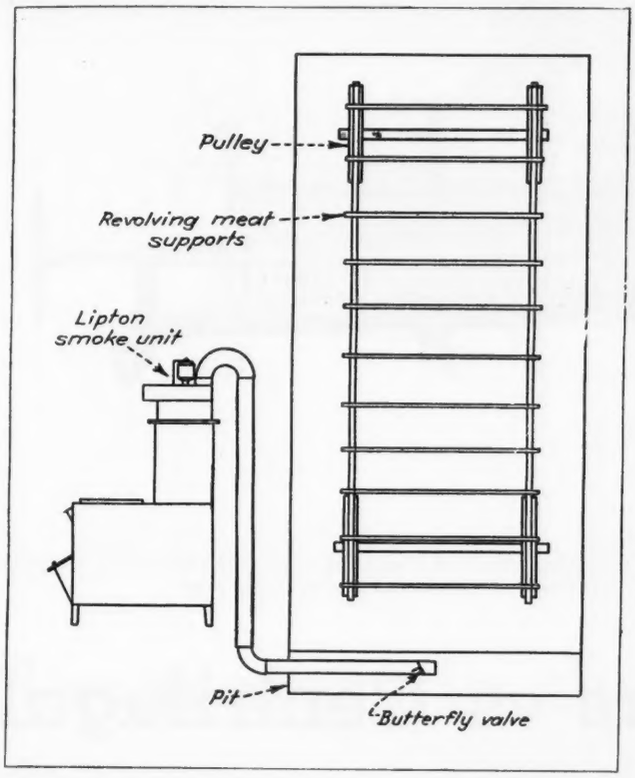
Because of changes in wind velocity and direction, revolving type of smokehouses are used. Some packers, without revolving type smokehouses, remove the cages from the houses, reverse them and then push them back into the houses so that all products will be subjected to the different smoke densities found in different parts of the house. Opening of smokehouse doors, however, is not recommended because of smoke and temperature losses.

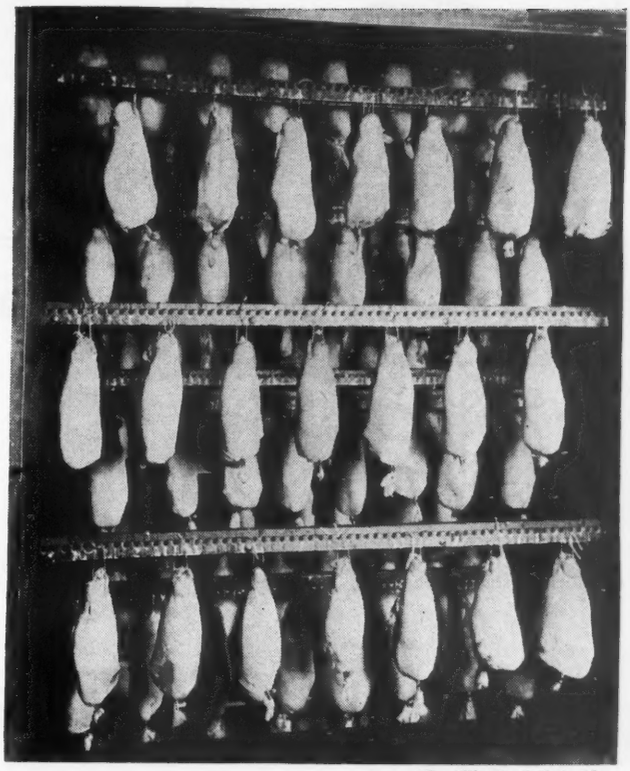
Construction and Operation Of Lipton Smoke Unit

The unit itself is about 3½ ft. in diameter and 7½ ft. high. It can be installed on the same floor as the smokehouse, or on floors either above or below it. The smoke unit can be used in houses heated with gas or steam. Or it can be used in air-conditioned, revolving, multi-storied houses, or houses with pits. The chimney, connected to a stack through the roof of a building, serves to carry off surplus smoke. Smoke is distributed from the smoke generating and washing unit into the smokehouse through a 9-in. duct. The duct may be connected to several branch supply lines, one for each house. Each branch line is equipped with a cut-off damper.

The water is turned on in the washer. Paper and dry sawdust are then ignited in the combustion chamber. The blower, which supplies air to the chamber, is turned on. After the sawdust starts to burn, damp sawdust is added by the

Smoke Generator Can Be Used With Revolving Smokehouse.



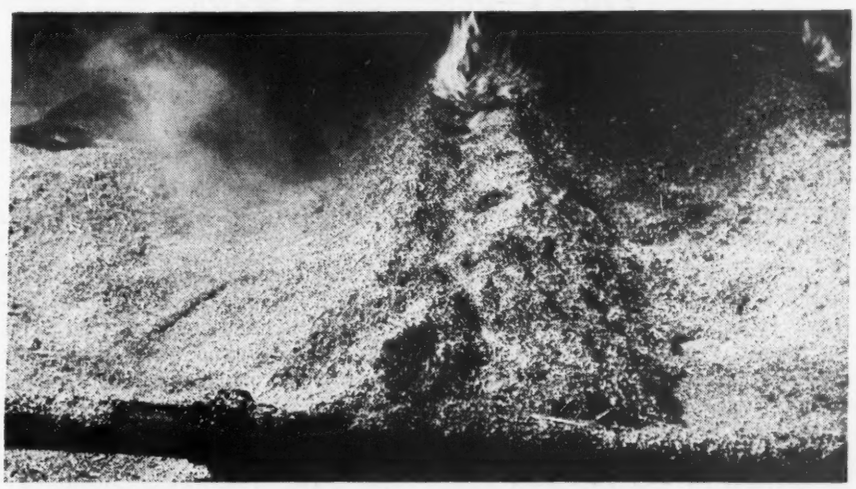


The Allbright Nell Co. photo

REVOLVING smokehouse (above) with smoke washing installation. Unit also delivers smoke to one or several smokehouses at same time.

UNIFORM temperature, humidity, smoke density and air circulation are provided with the use of a revolving smokehouse (upper right).

GAS FUEL is required in conventional type smokehouses. With the Lipton smoke generating and washing unit, no gas fuel is used (right).



sawdust feeder and the air supply is regulated. Eruption of sawdust caused by small exploding gas pockets is prevented by a vent pipe in the combustion chamber. Consequently, an even fire and continuous smoke supply are provided.

After the cut-off damper in the duct to the smokehouse is opened and the chimney damper closed, the blower is turned on and smoke is drawn up through a centrifugal washer. Excess smoke tars and resins are washed out, fly ash removed, live sparks extinguished and smoke is evenly distributed to smokehouses. Ashes, soot, tars and resins pass from the eliminator through a drain into a receptacle equipped with a strainer for easy cleaning.

Regulation of the smoke regulator and the draft covers is left entirely to the requirements of the smokehouses. It is necessary to keep the water running while the unit is in operation.

Each air-conditioned house is equipped with a fan for circulating heat and smoke in the house. Outlets for entering smoke and heat are on the bottom of most smokehouses. On the top and inside each house are one or more ducts which pick up the smoke and heat for recirculation. The air-conditioned house and smoke unit fans must not be hooked up together because of pressure differences. Smoke from the smoke generator must be injected to the inside ducts on the bottom with the outgoing stream of heat and smoke so that the blower fan in the house will have no influence on the smoke unit fan.

Maintenance

After the second or third day of operation, the tar-resin pot will be partly or entirely filled with tar, resin, soot and dust. It must then be cleaned and replaced.

For cleaning purposes, three steam connections are provided. These are located on top of the washer, on top of the fan and on the side of the washer.

The unit must be steamed out daily for 10 to 15 min. after each operation. Every four to six weeks the washer should be opened and thoroughly cleaned and remaining ashes should be swept out.

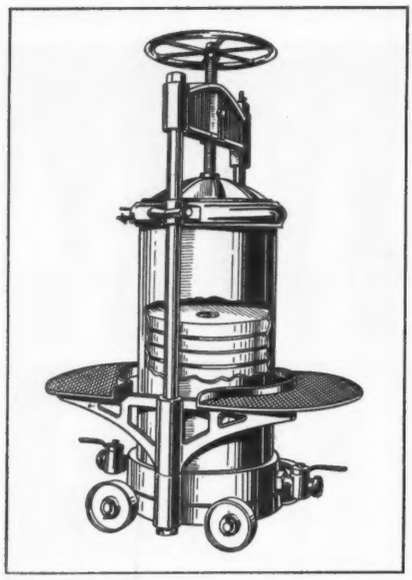


FIG. 1. PLATE type pulp filters consist of cylindrical shells containing cotton cakes.

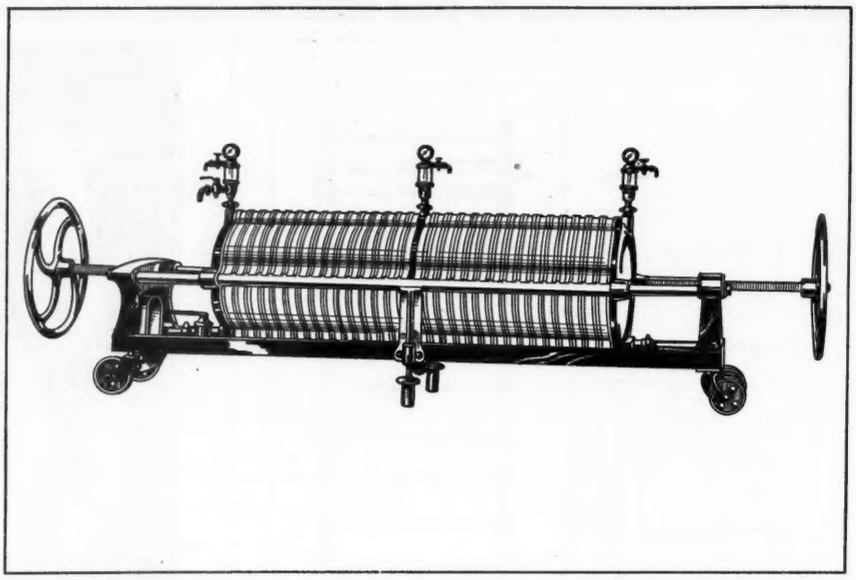


FIG. 2. SECTION type pulp filters consist of a series of round cells carried on a horizontal frame. They use cotton fiber filter cakes preformed in a hydraulic press.

Filters vs. Centrifugal

PART I—Differences in brewing and distribution practices in Europe and

By STEPHEN LAUFER, Director of Brewing Technology
Schwarz Laboratories, Inc., New York, N. Y.

EUROPEAN brewing technologists regard the introduction of centrifugal separators for the clarification of beer as one of the most important innovations made in recent years. American technologists, however, find centrifugation too slow; it does not produce as highly polished beer as filtration; the product is subject to chill, pasteurization and oxidation haze, and it will not withstand the wide distribution practiced in this country. To the American brewing technologist the use of filter-aid filters may be considered as a technological discovery equal in importance to the centrifugal separator.

Two Stages in Brewing

The brewing process involves two stages at which the important liquid is to be cleared from the suspended particles before further processing takes place. The first stage is reached when proteins and hop resins precipitate during wort boiling in the kettle and subsequent cooling to yeast pitching temperature. The precipitated material, known as sludge or trub, is separated to a greater or lesser degree from the wort prior to fermentation.

At the second stage the beer is finished off by thorough clarification to a perfect brilliancy so as to assure clarity and stability of the product for relatively long periods of time. Since the second stage is of greater importance, both economically and technically, than the first stage, the order will be reversed, and beer clarification will be discussed first, while separation of sludge from wort will be treated later on.

Beer Clarification

Beer, as it leaves the fermentation vats, contains numerous particles in suspension, such as yeast cells, precipitated proteins, protein-tannin compounds and hop resins. It is then subjected to the process of maturation and natural sedimentation for several weeks in storage vats at temperatures near freezing. In olden times, this was the only method used for beer clarification and often it took months to effect a satisfactory sedimentation yielding a fairly clear product. It is obvious that this method is impractical for a number of reasons: It requires a large investment in storage space and a large inventory of beer in process; it is costly and uncertain in results as to time and clarity.

To speed up natural sedimentation the practice of adding chips was initiated around 1860. These were made from beech wood and when added to the beer adsorbed the suspended particles, causing them to settle more rapidly and effectively. Frequently the chips were serious causes of infection, carrying foreign germs from one brew to another. The use of chips has practically disappeared in America. The use of isinglass and various gelatin compounds for effecting a better clarification was also established at the turn of the century, and this practice is still in use to a limited extent.

Pulp Filters

As the necessity for a more brilliant and stable product increased, due to the wider distribution of beer being packaged in bottles and shipped to distant localities, more essential means of clarification were sought. The solution to the problem was found in the pulp or "filtermass" filter, which was introduced into the brewery for the first time around 1880. Today, pulp

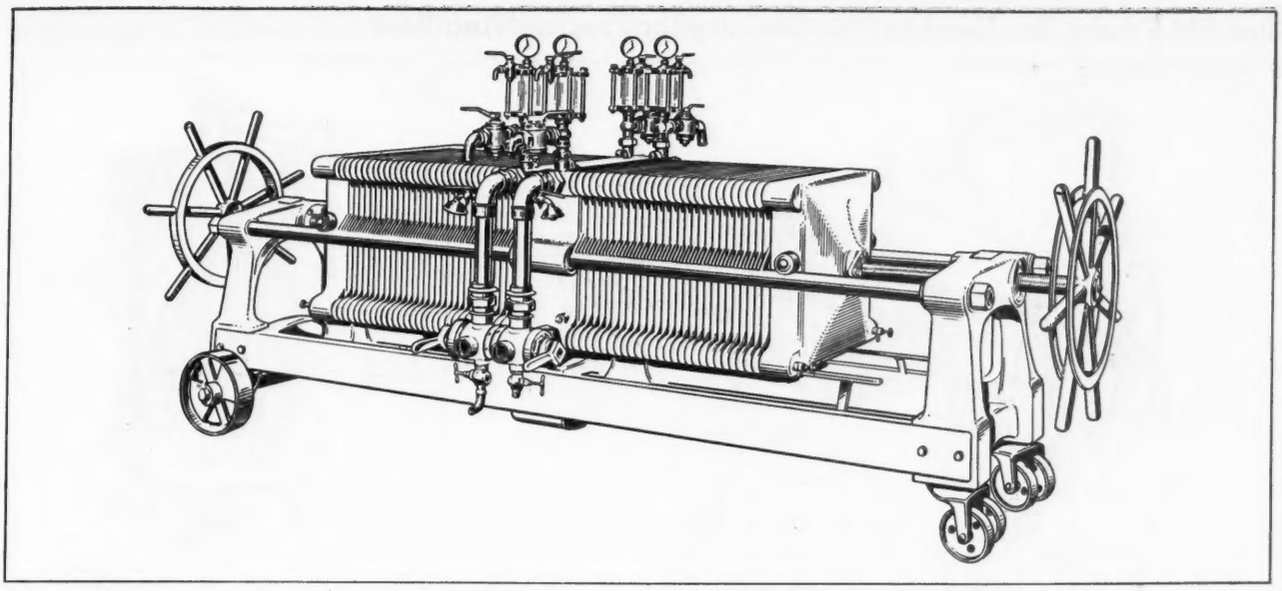


FIG. 3. SPECIAL type plate and frame filter, containing sheets made from cotton that can be used for several filtering cycles before discarding, are used for final polishing of beer in some European breweries. Sheets are backwashed and resterilized between cycles.

Separators In the Brewery

the United States determine suitability of equipment for clarifying beer

filtration is regarded as the best method of beer clarification, assuring a brilliantly clear beer and ale.

Pulp filters operate under pressure and two types are available. One type, known as the plate filter, (Fig. 1), is manufactured by Kiefer, Klein, Liquid Carbonic, Niagara, Schlangen and others. It consists of a cylindrical shell aligned vertically in which is stacked a series of round filter cakes of compressed cotton fiber about 2 in. thick. These are built up on tinned copper screens having perforated collars at the center. The filter cakes, which are formed in a hydraulic press, are placed between separating screens and fed into the filter. The unfiltered beer is pumped into the space between the shell of the filter and the filter cakes, and while traveling through the filtermass the suspended particles such as yeast cells, proteins and resins are retained by the fibrous mass due to adsorption. The clear liquid reaches the inner channel and is drawn off to another tank.

Another type of filter known as the Enzinger Section or "Schalen" filter (Fig. 2) consists of a series of round cells carried on a horizontal frame. The cotton fiber cakes are also prepared in a hydraulic press, but without screens. Both filters have about the same efficiency, but some breweries prefer one type to the other.

Pulp Washed and Reused

The pulp is washed in special washers and may then be used over again. The loss suffered during washings is replaced with new pulp. After some time the old pulp is discarded and new pulp introduced. Depending on the number and diameter of the cells, capacities are available from 20 to over 200 barrels per hour. In general, a pulp filter can handle about ¾ bbl. of beer for each square foot of filter area. Thus, a unit of 100 sq. ft. operates at the rate of approximately 75 bbl. of beer per hour.

As the pulp becomes contaminated with suspended matter the rate of filtration decreases and the pressure increases. Repacking of the filter with freshly washed mass then becomes necessary. About 1,000 to 2,000 and more bbl. of beer may be pressed through a filter in one cycle before repacking, the quantity depending on the clarity conditions of the beer being filtered.

The following objections are raised against pulp filters:

1. The filters require much labor in washing of the filtermass, pressing of the cakes and packing of the filter.

2. Clarification of beer is rather heterogeneous; the first portion of the beer running through the filter will usually be more sharply filtered than that passing through at the end of the filtration cycle. Furthermore, the first beer portion usually dissolves alkaline salts, such as lime, that had been adsorbed on the filtermass from the washing water. These salts may cause formation of precipitates, chiefly calcium oxalate, in the bottle later on.

3. If not properly cleaned, the pulp itself may serve as a source of beer infection.

On the other hand, the pulp filter has the following advantages:

1. The resultant beer is highly polished and brilliantly clear in appearance.

2. The clean pulp prevents the passage of microorganisms, allowing a biologically stable product.

3. As a result, the beer has greater physical and biological stability, shelf life and chill resistance.

The author recently spent a considerable period of time observing brewing practices in Europe. In Stockholm the largest breweries were using the method of complete clarification of beer by means of centrifugal separators. In Norway, Denmark and to some extent in England, the centrifugal separator was employed for preclarification, followed by a final polishing with pulp or sheet filters prior to pasteurization. In this article, methods of clarification of beer in this country and in Europe are discussed. In Part II, methods of clarifying wort will be covered.—The Editors.

Filter-Aid Filters Are Used in This Country for Preclarifying Beer

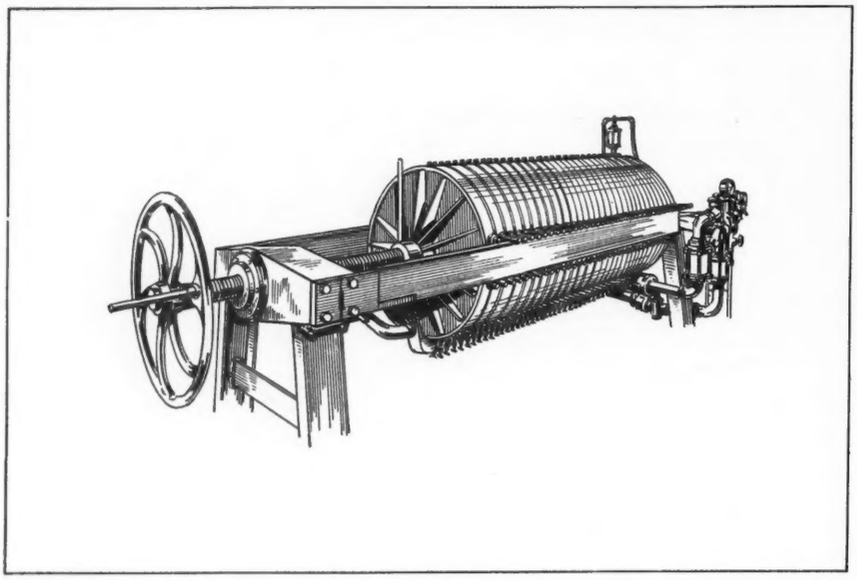


FIG. 4. RING FILTER. Round cells are first precoated with filter-aid. Then beer carrying a small percentage of filter-aid is pumped through the filter.

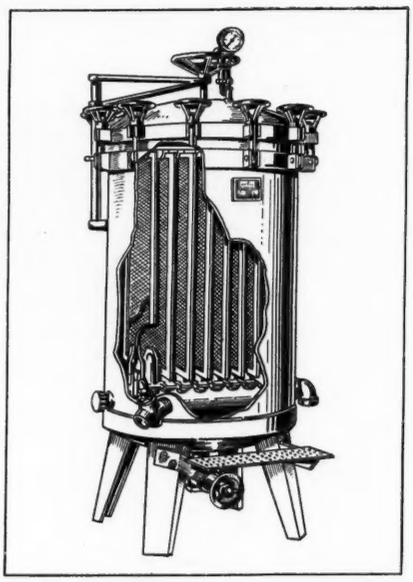


FIG. 5. CIRCULAR filter-aid filters have flat, easily removable fine mesh filter elements.

4. The pulp filters have great capacity, permitting large volumes of beer to be filtered in a minimum length of time.

Sheet Filters

For clarification of beer, some breweries in Europe employ a special type of plate and frame filter containing filter sheets made from cotton (Fig. 3). These sheets can be used for several filtering cycles, being backwashed and resterilized in the assembly between the cycles, and are then discarded. Washing of pulp and pressing of filter cakes are eliminated.

Filters of this type are used for final polishing following clarification by either pulp filters or centrifugal separators. With special sheets made from cellulose and asbestos germproof filtration of beer can be effected, obviating the need for pasteurization. This procedure, however, which was first introduced by Seitz, finds limited application in brewing operations.

Filter-Aid Filters

After repeal of Prohibition in 1933, filter-aid pressure filters were introduced into brewing operations. There are several types of this filter in use. Some of them consist of round cells of sections (Fig. 4), while others have the filtering elements, which are either circular or rectangular, located in a tank (Fig. 5). These elements have as an outer surface either a very fine screen or filter cloth that supports a film of the filtering medium.

The filter leaves are first precoated with filter-aid, such as diatomaceous silica, and the beer carrying a small percentage of filter-aid—0.1 to 0.7 lb. per bbl.—which is forked in from a slurry tank, is pumped through the filter. The filter-aids act as surface adsorbents. The particles attach themselves to the suspended impurities, forming aggregates large enough to be arrested by filtration. The filter-aids form a porous cake on the screen which traps yeast cells, proteins and other suspended particles. They are removed from the liquid at a rate proportionate to that of the filter-aid used.

The diatomaceous silicates that serve as filter aids are specially prepared powders, free from contaminating impurities and chemically inert in beer. They are available in different degrees of porosity, permitting their application to particles in suspension of varying degrees of fineness.*

This type of filter is manufactured by Bowser, Butler, Klein, Niagara, Sweetland, Zahm and others. All can readily be cleaned and the filter-aid is discarded after use. One sq. ft. of filtering area is usually good for the clarification of one bbl. of beer per hour. Filters are available having capacities ranging from 50 to over 400 bbl. per hour. They are used in breweries chiefly for prefiltration or preclarification of beer; in other words, beer coming from storage tanks and still containing suspended particles is prefiltered on the way to the finishing tanks. Some breweries employ prefiltration on completion of fermentation.

*Diatomaceous filter-aids are manufactured by Johns-Manville, Dicalite and others.

Final filtration and polishing are given to the product with the aid of a pulp filter. It is also possible to pass the beer through both filters without intermediate rest. By passing the beer first through a filter-aid filter, much of the slimy, gummy and gelatinous material is removed and the filtering cycle of the pulp filter is greatly increased. In this manner, much more beer can be filtered through the same pulp before the necessity arises for repacking of the filter with freshly washed filter pulp.

In some breweries, the filter-aid filter is being applied to both preclarification and final clarification with quite satisfactory results. There are great possibilities for developing further the application of the filter-aid filter along these lines in the future.

Centrifugal Clarification of Beer

Within the last few years, centrifugal clarifiers have been introduced in European breweries for clarification of beer. The method of clarification of beer with the aid of centrifugal force is regarded in some European circles as one of the greatest technical developments in recent years.

These centrifuges or clarifiers are manufactured by a number of firms abroad, such as Aktiebolaget Separator and Alfa-Laval in Stockholm, and Titan in Copenhagen. They are hermetically closed, bowl-shaped tanks having a great number of discs with a very small apex angle mounted closely together (Fig. 6). The discs divide the liquid into thin layers so that the

Centrifugal Clarifiers Are Used in Sweden for Complete Clarification

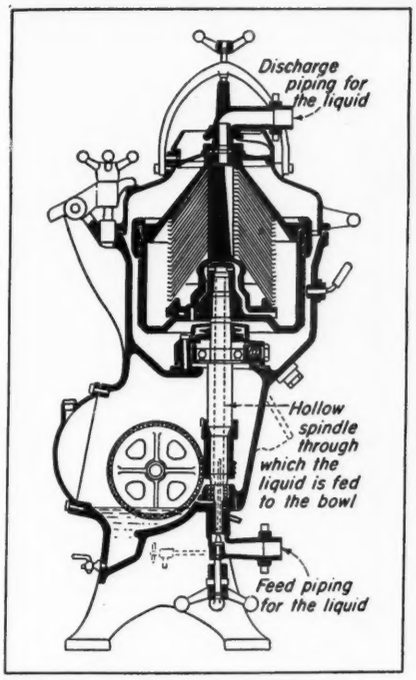


FIG. 6. CENTRIFUGES are bowl shaped tanks having a great number of discs.

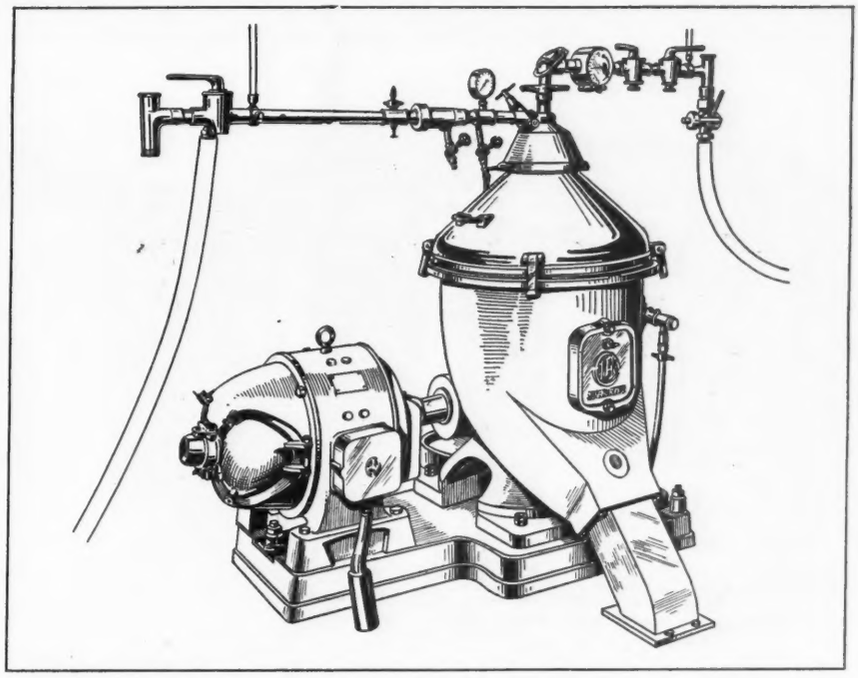


FIG. 7. CERTAIN types of centrifuges have capacities up to 80 bbl. per hr. They contain a patented device which permits the discharge of sludge at full speed.

centrifugal force can act on these layers. The revolving speed of the centrifuge bowl is maintained at about 6,000 rpm.; capacity is about 10 bbls. of beer per hour.

Centrifugal clarifiers are used in two ways in breweries:

1. Clarification of beer by means of centrifugal separators only.
2. Centrifugal separation in combination with filtration.

Adopted in Sweden

After a few years of experimental trials, the largest Swedish breweries in Stockholm have adopted in full the method of complete clarification of beer by means of centrifugal separators. It is admitted that this method does not produce as highly polished beer as filtration, and the product is more subject to chill haze and pasteurization haze than filtered beer, but it is to be borne in mind that the beer produced in Stockholm is not pasteurized.

Centrifugal clarification assures a satisfactory biological stability of the beer which holds up for at least three weeks at room temperature. Furthermore, it is claimed that centrifugal clarification yields a more homogeneous and uniform clearing effect than filtration. The clarifiers can readily be cleaned without disassembling by simple hosing with water. When working continuously with several machines, one can be stopped for cleaning; by procuring an extra bowl with a set of discs, the stop in operation is reduced to a minimum. The additional advantage of using a centrifugal separator is that beer losses are considerably reduced.

Chill Haze Not Removed

Chill haze is caused by the presence of protein-tannin compounds that precipitate out at temperatures near freezing. They go back into solution when the temperature of the beer rises. During centrifugation, a rise in temperature from 0.9 to 5.4 deg. F. occurs, which is caused by the resistance of the air as it strikes the outer wall of the separating bowl. Centrifuged beer, therefore, contains chill haze with the result that it is also more liable to develop pasteurization haze and oxidation haze later on.

Numerous experiments have been carried out by Elmfeldt on centrifugal separation of beer as compared with filtration. He was unable to establish any difference in taste between centrifuged beer and filtered beer. Experience gained by others in this field, however, seems to indicate that the centrifuged beer suffers in quality in the long run because of the retained chill haze. Removal of these substances may be accomplished if the beer is first precooled on the way to the clarifier.

Specially designed separators with built-in cooling units have been suggested as a means of eliminating this difficulty. At present, however, centrifuged beer is not suitable in appearance and stability for pasteurization and export.

With Pulp Filters

In other countries, such as Norway and Denmark, and also in some breweries in England, the centrifugal separator is being employed for preclarification of beer in combination with the pulp or sheet filter. The latter is used for final polishing prior to pasteurization. With this method, the capacity of both the separator and the pulp or sheet filter is considerably increased. The separator may yield as much as 35 to 50 bbl. per hr. and functions in this case in the same manner as the filter-aid filters in American breweries.

Certain types of clarifiers, such as CNS 151, Titan-Superjector (Fig. 7), will give a much greater capacity, up to 80 bbl. per hour. The centrifuge can also be used for separation of sludge from wort. This apparatus and similar types have the additional advantage of containing a patented device which permits the hydrostatic discharge of the sludge while the centrifuge rotates at full speed.

Limited Capacity

The possibility of manufacturing centrifugal clarifiers with higher capacities is stated to be rather slight. It is realized that there are certain limits to the dimensions for

(*Continued on page* 228)

CANS RUSTED and labels became rust-stained after the cans were moved from 31 deg. F. and then held for six days at 70 deg. F.

Condensation and Rust On Canned Goods In Storage

Moisture condenses on tin cans which are moved from cold to warmer rooms. Cans rust. Labels then become wet, wrinkled and rust-stained and cartons become damp. A method is suggested for overcoming condensation of moisture

By D. H. ROSE* and H. D. JOHNSON**

CANS, labels and even cartons are likely to become damaged when condensation appears on canned goods which are moved from low to high temperatures. When condensation does occur and it is appreciable, cans rust; labels appear wet, wrinkled and rust-stained and cartons become damp.

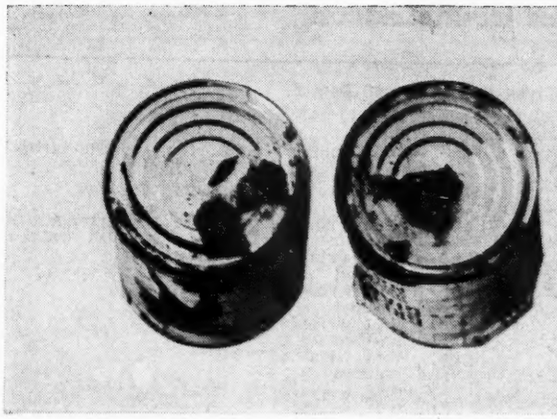
Condensation takes place when canned goods are shipped during cold weather from canneries by trucks or railroad cars to warehouses where higher temperatures prevail. Canned goods are not often held in cold storage. But when they are, condensation occurs when they are removed to higher temperatures.

Sometimes canned goods may be cooled close to or below their freezing point. If the commodities freeze, they may or may not become damaged. Undercooling and freezing data on canned goods, published in FOOD INDUSTRIES during the past two years, showed that foods can withstand subfreezing temperatures for some time without damage. Even if canned goods should not freeze, moisture will condense on the cans when they are moved directly into an unrefrigerated storage room or a grocery store (temperature 50 deg. F. or over). Greater condensation of moisture appears on canned goods when they are stored at higher humidities. In addition, condensation is greater the wider the gap between the temperature of the cans and the warmer room to which they are moved.

*Senior physiologist, Division of Fruit and Vegetable Crops and Diseases, USDA.
**Transportation specialist, Transportation, Rates and Services Division, Office of Distribution, War Food Administration.

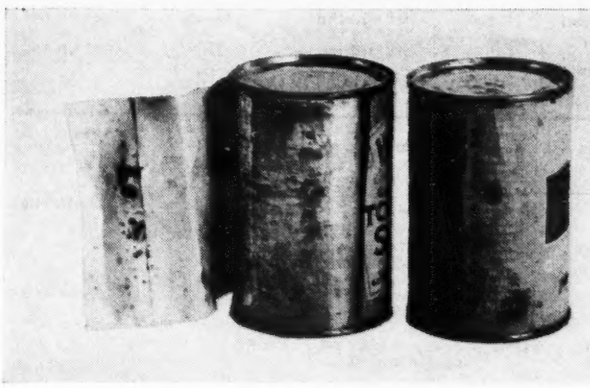
Warming Up Canned Goods

Consequently, when canned goods are removed from trucks or railroad cars during cold weather or from cold storage, they must be warmed up as gradually as is commercially practical. The warming up process should be taken in two

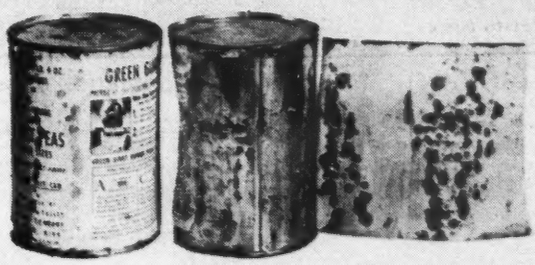


KIND OF TINPLATE had no influence on the extent of rusting of cans, provided that the cans were not enameled.

TOPS OF BOTTOM-LAYER cans rust more than tops of top-layer cans because of the collection of water on the bottom layer.



FORMATION OF RUST and rust stains was worse under the labels in those areas where the adhesive had been applied.



UNENAMELED CANS were badly rusted. Enameled cans were almost free of rust except on the rims and unenameled seams.

TABLE I—NUMBER, SIZE, TYPE AND CONTENTS of Cans Used for Condensation Tests.

Contents	No. of cans per carton	No. of layers of cans per carton	Size of can*	Kind of tinplate	Kind of coating Inside	Outside
Peas						
Trailer	...24	2	No. 2	....	Enameled	Enameled
Green Giant	...24	2	No. 2	....	None	None
Baked beans.	6	1	300-dia.	Plain external electrolytic	None	End enameled outside
Tomato soup.	36	3	No. 1	Plain hot-dipped bodies and plain electrolytic tinplate ends	None	None
Water						
No. 7244	...24	2	No. 2	1.25	None	None
No. 7245	...24	2	No. 2	0.50	Enameled	None
No. 7246	...24	2	No. 2	0.50	Enameled	Enameled

*Trade designation.

TABLE II—PREPARATORY TREATMENT of Cases of Canned Goods and Temperatures to Which They Were Moved in Condensation Tests*.

Cases	Preparatory treatment Temperature, deg. F.	Duration, weeks	Moved to deg. F.	Duration of test, weeks
One set of one carton each of peas and Nos. 7244, 7245 and 7246	31	1	60	4
One set of one carton each of baked beans and tomato soup***	15	1**	60	4
Sets of one carton each of peas, baked beans, tomato soup. Sets of Nos. 7244, 7245 and 7246.....	31	1	70	4
	50	1	80	4

*Consisted of cans of peas and Nos. 7244, 7245 and 7246 that had been moved from 15 to 31 deg. F., 31 to 40 deg. F. and 50 to 60 deg. F. in an earlier condensation test. These cans showed no rust.

**Contents of cans were in a frozen condition when cartons were moved to 60 deg. F.

***Cans of baked beans and tomato soup had not been previously used.

or three steps, with the temperature "jump" in each step about 10 deg. F., but no higher than 15 deg. F. A delay of one or two days at each intermediate temperature will be sufficient to warm the cans so that they can be safely moved to the next temperature in the series.

Condensation and Can Rusting

Tests were conducted at the cold storage research laboratory of the Plant Industry Station, Beltsville, Md., to determine the conditions favoring condensation and rusting on canned goods. The research showed that the amount of condensation increased on the cans in direct proportion to the gap between the temperature of the cans and the warmer room to which they might be moved.

Cans showed little or no condensation when they were moved to rooms 9 to 16 deg. F. warmer than the cans. When the temperature gap was 20 deg. F. or more, however, condensation occurred almost immediately in rooms where the relative humidity was 85 percent. Rust then appeared on the cans within 48 hours. The rust first showed up on the rims and seams of the cans. A day or two later, the sides and ends of non-enameled cans rusted.

Rust which appeared on the rims and seams of cans was possibly due to a breaking of the tinplate by the strain developed when the cans were fabricated and later sealed.

In cartons, the tops of bottom-layer cans showed more rust than the tops of top-layer cans. Presumably, water of condensation ran

TABLE III—CONDITION of Canned Goods Moved From 15 to 60 Deg. F.

Contents	Period in storage, days	Condensation	Rust: Rims	Rust: Ends	Rust: Sides	Labels	Carton	Remarks
Baked beans, enameled on ends	1	Frost on all	None	None			Wet	
	2	Heavy	V. slight	V. slight*	V. slight	Wet, wrinkled, stained	Wet	Carton stained with water
	4	Heavy	V. slight	V. slight	V. slight	Wet, wrinkled, stained	Damp	
	10	Slight	Slight	Slight	V. slight	Wet, wrinkled, stained	Damp	
	18	Slight	Slight	Slight	V. slight	Wet, wrinkled, stained	Dry	
	28	None	Slight	Slight	V. slight	Wet, wrinkled, stained	Dry	
Tomato soup, plain	1	Heavy	None	None	None	Wet, wrinkled	Wet	
	2	Heavy	Slight on lower	Slight on all tops	None	Wet, wrinkled	Wet	
	4	Heavy	Slight on all	Slight on all tops	None	Wet, wrinkled	Damp	Rust on seams
	10	Light	Slight on all	Slight on all tops	None	Wrinkled	Damp	Rust on seams
	18	Light	Slight on all	Slight on all tops	None	Wrinkled	Damp	Rust on seams
	28	None	Slight on all	Slight on all tops	None	Wrinkled	Dry	Rust on seams

*Next to rims.

TABLE IV—CONDITION of Canned Goods Moved From 31 to 60 Deg. F.

Contents	Period in storage, days	Condensation	Rust: Rims	Rust: Ends	Rust: Sides	Labels	Cartons	Remarks
Peas,* enameled	1	Heavy	None	None	None	Wet, wrinkled	Wet	
	2	Heavy	Slight on bottom rims, top layer	None	None	Wet, wrinkled, stained along seams	Wet	
	4	Heavy	Slight on all	Rust on tops of 2, bottom layer	Slight	Wet, wrinkled, stained along seams	Damp	Rust on seams
	10	Slight	Heavy	Heavy rust, top of bottom layer	Slight	Wet, wrinkled and stained	Damp	
	18	Slight	Heavy	Heavy rust, top of bottom layer	Slight	Moldy	Damp	
	28	None	Heavy	Heavy rust, top of bottom layer	Slight	Moldy	Dry	
No. 7244**, water plain	1	Heavy	None	None	None	None	Wet	
	2	Heavy	Slight on bottom layer	Slight on tops of 3 bottom cans	None		Wet	Some discolored water on tops
	4	Heavy	Slight on bottom layer	Some on all cans	None		Damp	Some rust on seams
	10	Slight on lower layer	Heavy	Tops	Slight		Bottom wet	Some rust on seams
	18	None	Heavy	Rust increased on tops	Slight		Bottom wet	Some rust on seams
	28	None	Heavy	Rust increased on tops	Slight		Dry	Some rust on seams
No. 7245, water, plain	1	Heavy	None	None	None		Wet	
	2	Top layer, heavy; bottom layer, slight	Slight on upper layer	None	None		Damp, water on bottom	
	4	Top layer, heavy; bottom layer, slight	Slight on upper layer	Tops of bottom layer	None		Damp, water on bottom	Some rust on seams
	10	Top layer, heavy; bottom layer, slight	Heavy on all	Tops of both layers	None		Damp, water on bottom	Heavy rust on seams
	18	Heavy on bottom layer	Heavy on all	Tops of both layers	None		Damp, water on bottom	Heavy rust on seams
	28	None	Heavy on all	Tops of both layers	None		Dry	Heavy rust on seams
No. 7246, water, enameled	1	Heavy	None	None	None		Wet	
	2	Heavy	None	None	None		Wet	
	4	Heavy	Slight	None	None		Damp	Slight rust on seams
	10	Slight on top layer	Slight	None	None		Damp, bottom wet	Slight rust on seams
	18	Slight on top layer	Slight	Rust stains top of few cans	None		Damp, bottom wet	Slight rust on seams
	28	None	Slight		None		Dry	Slight rust on seams

*Cans in two layers.
**No labels on Nos. 7244, 7245 and 7246.

down from the top-layer cans and collected on the cans in the layer below.

Condensation and Label Damage

Labels became wet and wrinkled 24 hours after the canned goods were moved to warmer temperatures. Once the labels were wrinkled, they remained in that condition.

Rust was found under the labels, and the labels then became rust-stained after ten days. More rust appeared on the sides of labeled cans where the adhesive had been applied. The sides of labeled, non-enameled cans showed more evidence of rust than unlabeled cans.

Less rust appeared on enameled than on non-enameled cans. Enameled cans were found almost free of rust, except for the rims and unenameled seams. Rusting was not influenced by the kind of tinplate used (hot-dipped or electrolytic), provided neither was enameled.

Cans Enameled Inside and Outside Show Least Amount of Rusting

TABLE V—CONDITION of Canned Goods Moved From 31 to 70 Deg. F.

Contents	Period in storage, days	Condensation	Rust: Rims	Rust: Ends	Rust: Sides	Labels	Carton	Remarks
Peas, not enameled	1	Heavy	Slight	None	None	Wet, wrinkled	Damp	
	2	Heavy	Slt. to heavy on all	Rust col. water on top of bot. 1	Slt. to heavy	Wet, wrinkled	Wet	Labels stained with rust
	4	Heavy	Slt. to heavy on all	Rust col. water on top of bot. 1	Slt. to heavy	Wet, wrinkled	Wet	All cans have film of discolored water
	10	Heavy	Bad on all	Tops, both 1	Slt. to heavy	Wet, wrinkled, badly stained	Damp	
	18	Heavy	Bad on all	Bad on tops, bot. layer	Slt. to heavy	Wet, wrinkled badly stained	Damp	
	28	None	Bad on all	Bad on tops, bot. layer	Slt. to heavy	Dry stained, wrinkled	Dry	Labels slightly moldy
No. 7244* water, plain	1	Heavy	None	None	None		Damp	
	2	Heavy	Slt. on all	Tops, few cans	Slight		Wet	Rust on seams
	4	Heavy	Slt. on all	Tops, few cans	Slight		Wet	Seams worse
	10	Slt. on bot. 1	Bad on all	Tops, all cans	Slight		Damp	Rust on seams
	18	Slt. on bot. 1	Bad on all	Tops, all cans	Slight		Damp	
	28	None	Bad on all	Tops, all cans	Slight		Dry	
No. 7245 water, plain	1	Heavy	None	None	None		Damp	
	2	Heavy	Top & bot. rims of both layers	None	Slight		Wet	
	4	Heavy	Top & bot. rims of both layers	Top of bot. lay.	Slight		Wet	
	10	Light	Top & bot. rims of both layers	Top of bot. lay.	Slight		Damp	
	18	Slt. bot. lay.	Top & bot. rims of both layers	Top of bot. lay.	Slight		Damp	
	28	None	Top & bot. rims of both layers	Top of bot. lay.	Slight		Dry	
No. 7246 water, enamel	1	Heavy	None	None	None		Damp	
	2	Heavy	All, on top 1, top rims, lower lay.	Rust col. water tops of top 1	None		Wet	Rust on seams
	4	Heavy	All, on top 1, top rims, lower lay.		None		Wet	
	10	Heavy	All, on top 1, top rims, lower lay.	Rust col. water tops of top 1	None		Damp	
	18	Slight	All, on top 1, top rims, lower lay.	Rust col. water tops of top 1	None		Damp	
	28	None	All, on top 1, top rims, lower lay.	Rust col. water tops of top 1	None		Dry	
Baked beans, enameled on ends	1	Heavy	None	None	None	Wet, wrinkled	Damp	
	2	Heavy	V. slt. on all	None	Slight	Wet, wrinkled	Wet	
	4	Heavy	V. slt. on all	None	Slight	Wet, wrinkled	Wet	Labels stained
	10	Heavy	Slt. to heavy	None	Slight	Wet, wrinkled	Damp	Labels stained
	18	Slight	Slt. to heavy	None	Slight	Wet, wrinkled	Damp	Labels stained
	28	None	Slt. to heavy	None	Slight	Wet, wrinkled	Dry	Labels stained
Tomato soup, plain	1	Heavy	None	None	None	Wet, wrinkled	Soaked	
	2	Heavy	Some cans, all layers	Tops of some cans, all lay.	None	Wet, wrinkled	Wet	Water on tops of second lay. cans
	4	Heavy	All layers	Tops of some cans, all lay.	None	Wet, wrinkled	Wet	Labels stained
	10	Top of bot. layer	Heavy on all	Slight on tops most cans	Slight	Wrinkled, stained	Damp	
	18	Top of bot. layer	Heavy on all	Slight on tops most cans	Slight	Moldy	Damp	
	28	None	Heavy on all	Slight on tops most cans	Slight	Moldy	Dry	

*No labels on Nos. 7244, 7245 and 7246.

TABLE VI—COMPARISON OF DAMAGE by Rust on Different Kinds of Cans After 25 Days' Storage at Higher Temperatures.

Contents of cans	Kind of tinplate	Coating	Rating after 25 days: From 15 and 31 to 60 deg. F.	From 31 to 70 deg. F.	From 50 to 80 deg. F.	Average
Peas						
Green Giant..	Ends, 0.50; sides, unknown	None	..	5	5	5.0
Trailer	Unknown	Enameled	2*	..	..	2.0
Water						
No. 7244.....	1.25	None	5	6	2	4.3
No. 7245.....	0.50	Enameled inside	6	2	6	4.6
No. 7246.....	0.50	Enameled inside and outside	1	1	1	1.0
Baked beans...	Plain external electrolytic bodies	Enameled ends	4	4	3	3.6
Tomato soup...	Plain hot-dipped bodies and plain electrolytic tinplate ends	None	3	3	4	3.3

*Figures indicate severity of damage by rust; 1 signifies least damage, and 6, most damage.

Condition of Cartons

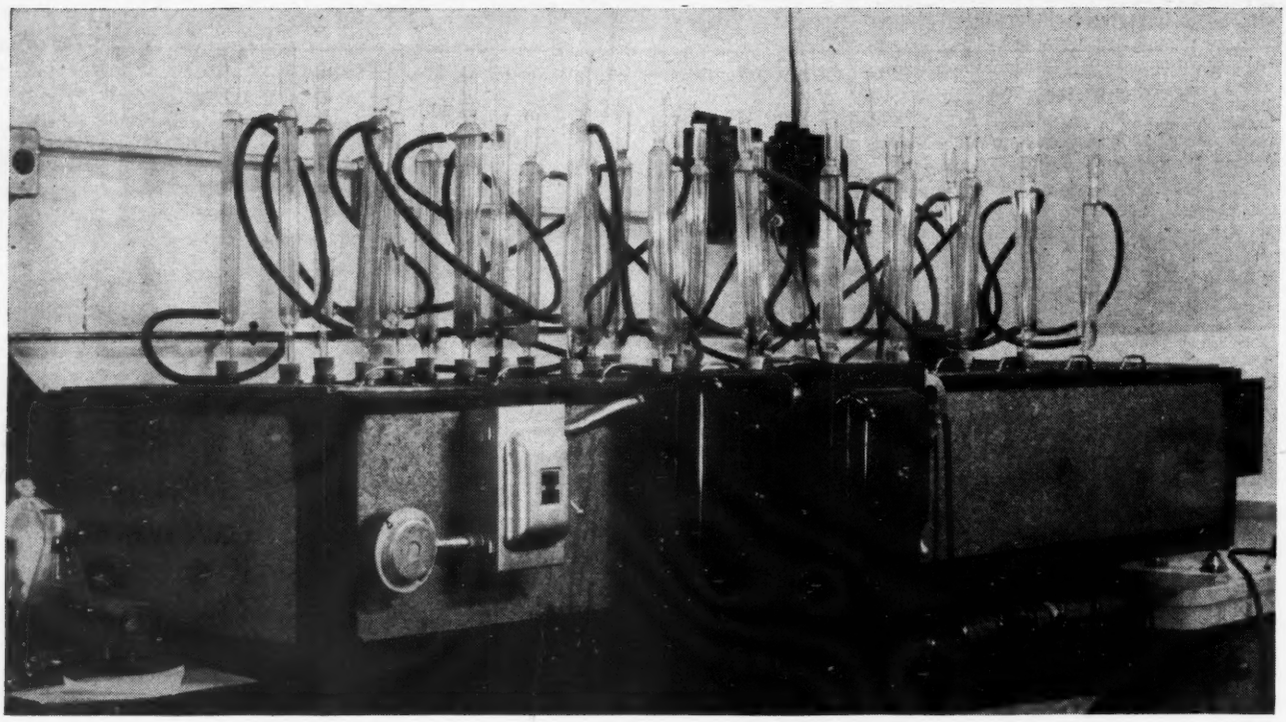
Depending upon the amount of condensation, cartons remained either dry or became damp. For example, if cartons were moved from 15 to 31 deg. F., 31 to 40 deg. F., and 50 to 60 deg. F., condensation

(*Continued on page* 228)

Results of other investigations conducted by the authors on storage and shipment of canned and bottled goods were published in Food Industries during the past two years. Valuable data on the freezing points of canned and bottled goods were published in the April, June, July, September and November, 1946, and the February, 1947, issues of Food Industries. This work will facilitate storage and shipment of these goods in cold weather. All commodities exhibited the undercooling phenomenon, which almost always saved them from immediate damage when exposed for short periods to temperatures below their freezing points.

In the September, 1947, issue of Food Industries tests made on cartons of canned foods showed that undercooling further extended freezing time when the canned foods were packed in cartons, still further when the cartons were stacked.

Another series of tests on the freezing of fats, oils and their products was published in the May, 1947, issue of Food Industries.—The Editors.



TEST protein material was weighed into liter Erlenmeyer flasks, then digested with 20-21 percent hydrochloric acid, in this temperature controlled bath. Reflux condensers were used to prevent loss of acid during the 20-148 hr. digestion.

Low Temperature Hydrolysis Of Commercial Proteins

Hydrolysates with improved flavor and higher amino acid content result when commercial protein materials are treated with hydrochloric acid at 167 or 176 deg. F. instead of at higher temperatures commonly used

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THIS work was undertaken to compare hydrolysates prepared at low temperature with those made by the conventional method of hydrolyzing by boiling at or above atmospheric pressure. Hydrochloric acid was the hydrolytic agent. Soy meal, soy protein, linseed meal and cottonseed meal were the protein sources. A total of 119 samples were prepared at 167, 176 and 221 deg. F. in a constant temperature oven of original design. Koch's micro-Van Slyke apparatus was used to determine amino acid nitrogen. For total nitrogen determinations a micro-Kjeldahl apparatus was employed. These studies demonstrated that hydrolysis at 167-176 deg. F. results in better flavor character and higher amino acid content in the hydrolysate than can be obtained at the boiling temperature.

Protein Chemistry

It is only within the last three or four decades that protein composition has been understood clearly, due to the labors of Fischer, Sorensen, Svedberg, Van Slyke, and many others.[1]

Protein suspensions in hydrochloric acid are usually boiled at atmospheric pressure or under applied pressure to produce mixtures of alpha amino acids, ammonia and non-protein groups. A quantitative separation of the cleavage products is a difficult problem. Dakin's procedure for the separation of monoamino acids from the hydrolysis mixture is probably the most important recent advance in the technic of protein analysis, and has enabled him to increase the summation of amino acids in gelatin to 91.3 percent and in zein to 101.5 percent. Vickery,[2] on the basis of this new knowledge, predicts that the complete analysis of the entire molecule of at least one protein may be expected in the near future.

Plimmer[3] reviewed the entire field of pure protein hydrolysis up

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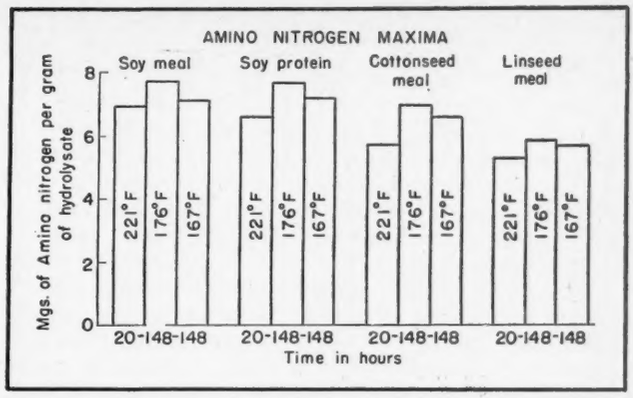
TABLE I—PROXIMATE ANALYSES FOR CRUDE PROTEINS

Product	Protein (Nx6.25) (Percent)	Fat (Percent)	Carbohydrate Minerals (Percent)	Fiber (Percent)	1941 Price (Dollars per ton)
Solvent Extracted Soy Meal..	52.0	0.75	45.25	2.0	30.00
Special Soy Protein ...	51.0	0.75	46.25	2.0	100.00
Linseed Meal	34.5	6.00	50.50	9.0	49.00
Cottonseed Meal	40.5	5.50	45.00	9.0	47.00

CRUDE proteins contain fat, fiber and high percentage of carbohydrate. Preliminary solvent extraction of fatty proteins will preclude rancidity. High carbohydrate content is likely to result in humin formation, hence should be removed also.



CHARTED experimental results show higher amino acid yield from the crude proteins at hydrolyzing temperature of 176 deg. F.

TABLE II—AMINO NITROGEN MAXIMA

Protein source	Expt. no.	Protein gms.	21% HCl gms.	Temp. deg. F.	Time hrs.	Hydrolysate Nitrogen Total nitrogen* mg's./gm.	Total nitrogen** mg's./gm.	Amino nitrogen mg's./gm.	Flavor
Soy Meal	14 S	320	640	221	20	19.7	16.0	6.899	sl. burnt
	17 S	320	640	176	148	19.7	16.1	7.681	good
	20 S	320	640	167	148	19.7	16.1	7.191	excellent
Soy Protein	12 SP	320	640	221	20	19.5	15.9	6.638	good
	15 SP	320	640	176	148	19.7	16.0	7.607	good
	18 SP	320	640	167	148	19.6	16.0	7.254	good
Cottonseed Meal	12 CS	320	640	221	20	16.9	13.1	5.839	good
	15 CS	320	640	176	148	16.9	13.3	6.953	good
	18 CS	320	640	167	148	17.0	13.2	6.676	good
Linseed Meal	12 LM	320	640	221	20	14.1	10.6	5.366	good-sweet
	15 LM	320	640	176	148	14.0	10.5	5.857	good-sweet
	18 LM	320	640	167	148	14.0	10.3	5.687	good-sweet

*Before ammonia removal.
**After ammonia removal.

YIELD of amino nitrogen was highest with soy meal mixture hydrolyzed for 148 hours at 176 deg. F. with 21 percent hydrochloric acid. Amino nitrogen in finished hydrolysate was usually proportional to protein in mixture.

to 1917, whereas Osborne[4] covered the subject of vegetable protein hydrolysis to the year 1924.

Carpenter[5] hydrolyzed dilute 1 percent casein solutions and studied changes in the hydrolysis rate due to variations in temperature and pH. Enzymes were used by Carpenter to catalyze these reactions at pH's 1 to 3, and 6 to 12; and at temperatures of 41, 77, 104 and 140 deg. F. Nasset and Greenberg[6] showed that the rate of hydrolysis with an acid catalyst is proportional to the hydrogen ion activity of the acid. Dernby[7] studied the effects of hydrogen ion concentration upon hydrolysis rates using enzymes as catalytic agents.

Three Factors Studied

The present study of hydrochloric acid hydrolysis shows the influence of: (1) Hydrogen-ion concentration, (2) protein concentration, and (3) temperature, upon the hydrolysis rate and the hydrolysate character of four important and easily obtainable crude proteins.

Apparatus and Methods

A constant temperature oven was designed to reflux 33 samples at one time. The oven was electrically controlled and heated, utilizing an air bath as the medium of heat transfer. It was built to operate continuously (see illustration).

After various analytical methods for determining aliphatic amino nitrogen groups were studied, it was decided that Van Slyke's volumetric procedure was best suited for this work.[8] Koch's modification of the micro-Van Slyke volumetric apparatus was chosen.[9]

A modification of the standard micro-Kjeldahl apparatus was used for the determination of total nitrogen in the hydrolysates.[10]

Preparation of Samples

Analyses for each of the commercial protein bearing materials used in preparing the hydrolysates are shown in Table I.

The crude protein was weighed, mixed with water, transferred to a one liter Erlenmeyer flask, and the calculated amount of hydrochloric acid added to give a constant boiling mixture (acid strength 20-21 percent).

Units of 33 samples were prepared as described above. These mixtures were then placed in the specially designed constant temperature oven and hydrolyzed at 221, 176 or 167 deg. F., according to conditions indicated in preliminary studies.

At the end of the hydrolyzing period the flasks and contents were cooled to room temperature and neutralized slowly with 50 percent sodium hydroxide solution. As neutralization proceeded the temperature was checked frequently and held below 176 deg. F. After the calculated amount of alkali had been added, the mixture was cooled to room temperature and the pH determined on a Beckman Model G pH meter equipped with industrial type electrodes. Before storing any samples the pH was carefully adjusted to 5.1.

After neutralization the mixture was poured into a 16 cm. Büchner funnel mounted on a one liter suction flask and fitted with a fine grade of filter paper. Suction was applied slowly by means of an aspirator attachment. When residue thicknesses exceeded 2 cm. or if filtration proceeded too slowly the paper was changed. Waxy residues prevented rapid filtration of several samples. When this condition was encountered the pH was lowered to 2 or 3, after which the solution was re-filtered.

Discussion of Results

This work was undertaken to determine the feasibility of hydrolyzing crude proteins with hydrochloric acid at temperatures below boiling, and to compare the character of hydrolysates made in this manner with those produced by the conventional method of hydrolyzing by boiling. The effects of acid strength and protein concentration

were also studied for four commercial protein materials. It was determined that low temperature hydrolysis (167-176 deg. F.) offers many advantages since the flavor is superior and the amino nitrogen content of the hydrolysate is larger. Due to a slower breakdown of the protein, the reaction can be closely regulated.

Since the aliphatic amino nitrogen content of a hydrolysate indicates the degree of hydrolysis achieved in a given sample, Van Slyke's volumetric gasometric procedure offers a convenient method for setting up controls. From Table II it is apparent that hydrolysis at 167-176 deg. F. for 148 hr. produces higher amino nitrogen values than does hydrolysis at 221 deg. F. for 20 hr.

Effects of Acid Strength And Protein Concentration

The amino nitrogen values of the finished hydrolysates were always larger in those samples containing higher protein or acid concentrations.

Time Factor Influence

As the time factor increased, the amino nitrogen content of the finished hydrolysates increased. Preliminary work showed that at 167-176 deg. F., time factors could be lengthened far beyond the limits used in the present work without the constituents of the hydrolysate starting to decompose.

Optimum Conditions For Amino Nitrogen Production

All together, in addition to preliminary studies, 56 hydrolysis experiments were made on soy meal, 27 on soy protein, 18 on cottonseed meal and 18 on linseed meal. Variables were temperature, time, protein concentration and hydrochloric acid concentration. The significant data obtained in these experiments are summarized in Table II. In this table are listed "Amino Nitrogen Maxima" for the three temperature variables (167, 176 and 221 deg. F.), with the four protein base materials examined. The chart was drawn by selecting that particular set of conditions, at a given temperature, which resulted in the maximum degree of amino nitrogen production for each material tested.

From Table II and the chart it is evident that soy meal constituting 33 percent by weight of the original hydrolysis mixture, when hydrolyzed for 148 hr. at 176 deg. F., using 21 percent hydrochloric acid, yielded the highest amino nitrogen content of any finished hydrolysate. Soy protein hydrolyzed under identical conditions had a slightly lower amino nitrogen content. Cottonseed meal and linseed meal ranked third and fourth, respectively.

In general, it can be said that for all experiments the amino nitrogen content of the finished hydrolysate varied directly with the protein content of the original hydrolysis mixture (see Tables I and II). Soy meal which analyzed 52 percent by weight of protein (Table I) had the highest integral protein content of the four materials hydrolyzed. Hence, the higher relative amino nitrogen contents of finished hydrolysates made from soy meal were to be expected.

Economically, soy meal is superior to linseed meal, cottonseed meal or soy protein. (See Tables I and II.)

It was determined that fatty protein materials like linseed meal, cottonseed meal or soy protein should be solvent-extracted prior to hydrolysis in order to assure palatability and preclude rancidity. All samples were stored in flint glass containers for at least 6 weeks at room temperature prior to analysis or examination.

Since commercial protein materials, such as those tested in this research problem, have high carbohydrate content, it might be advantageous to remove carbohydrates first before hydrolyzing. Thus humin formation resulting from the condensation of the indole nucleus of tryptophane with the aldehyde group of the carbohydrate could be minimized. Carbohydrate removal can be achieved at a controlled pH by over-night extraction with a hydrochloric acid solution.[11]

Use of Lower Temperatures

Lower temperatures than 167 or 176 deg. F. should be investigated in subsequent work to determine whether further improvements could be made in hydrolysis applied to food preparation.

In work not yet published, Royal[12] has obtained the following data on the room temperature hydrolysis of corn protein with 34 percent hydrochloric acid:

Corn Protein (70 percent).....200 gm.
Hydrochloric Acid (34 percent) 674 gm.

1. Stood 4 mon. at room temp. (77-91½ deg. F.).
   Percent amino nitrogen = 4.33.
   Some leucine and tyrosine found, but no glutamic acid.
2. Stood for 1 yr. at room temp.
   Percent amino nitrogen = 7.45.
   Leucine and tyrosine present, but no glutamic acid.
3. Stood for 3 yrs. at room temp.
   Percent amino nitrogen = 8.20.
   Leucine and tyrosine present, and weight of glutamic acid hydrochloride = 24.8 gm.

In the practical application of hydrolysis methods described in this article, humin residue disposal presents a formidable problem. Since the residue constitutes between 10 and 15 percent by weight of the neutralized hydrolysates, and due to its influence on filtration and amino nitrogen yield, it is an important subject for further research. After the extraction of amino acids and sodium chloride, such residues might find application as extenders for plastic molding powders, paint pigments, core binders, cattle feed supplements or filter aids for oils.

Summary

This research shows that:

1. Low temperature (167-176 deg. F.) acid hydrolysis has some important advantages over high temperature hydrolysis in the preparation of palatable foods.

2. Koch's micro modification of the Van Slyke volumetric gasometric apparatus for determining aliphatic amino nitrogen values provides a convenient, rapid and accurate means for checking the degree of hydrolysis.

3. In the finished hydrolysate, amino nitrogen content is directly proportional, within the limits investigated, to: (a) Protein concentration, and (b) hydrogen ion concentration in the original hydrolysis mixture.

4. Solvent extracted soy meal is a valuable protein source which may provide an important supplement in our national protein dietary through the hydrolysis medium.

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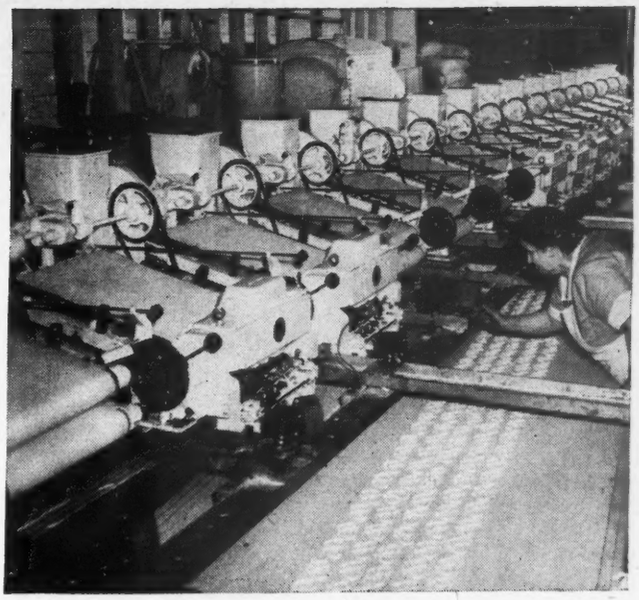
1. STARTING on its way to becoming a batch of pretzels, the dough is piled into trucks and hauled to twisters' hoppers.



2. ROLLED AND TWISTED, the pretzels emerge from each of the 16 machines, row-by-row onto a conveyor belt.

Dough With A Twist

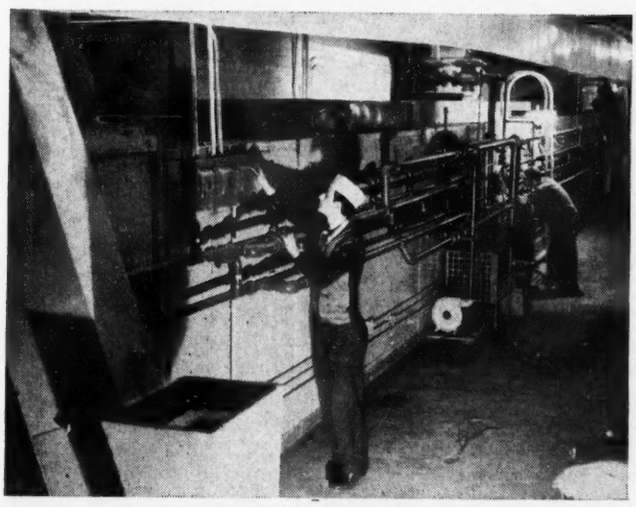
Pretzel making is made to look easy in these pictures—but you need the right equipment

PRETZEL making, in passing from an art to just another machine operation, may be losing some of its glamor. But the pretzel itself is due for a widespread build-up through promotion by the pretzel bakers and distributors. In tune with this promotion, this picture story gives you a glimpse inside a pretzel plant.

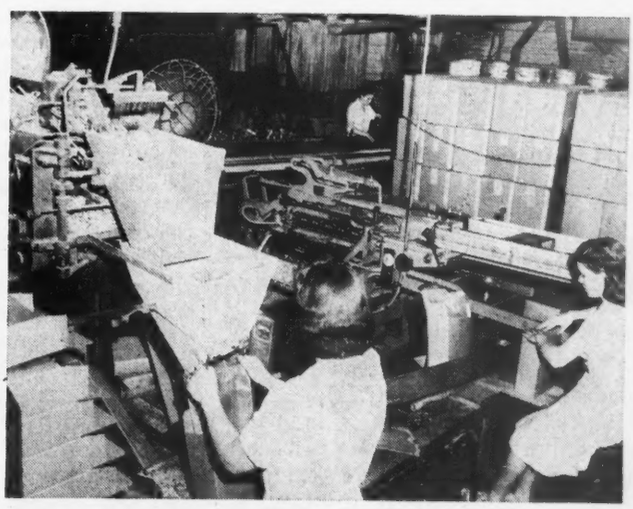
The pictures were made at Halter's Pretzels, Inc., Canton, O., where machines long ago replaced hand twisting. Recently the old machines were replaced by 16 new ones in what amounts to a pilot installation by the American Machine & Foundry Co. The new twisters will do better than 60 pretzels per minute each, as against about 36 per minute for the old machines.

While hand twisters do around 40 per minute in tests, they do not maintain such an average very long. The machines not only keep their pace, day after day, but the pretzels are all uniform and show no fingermarks on their surfaces.

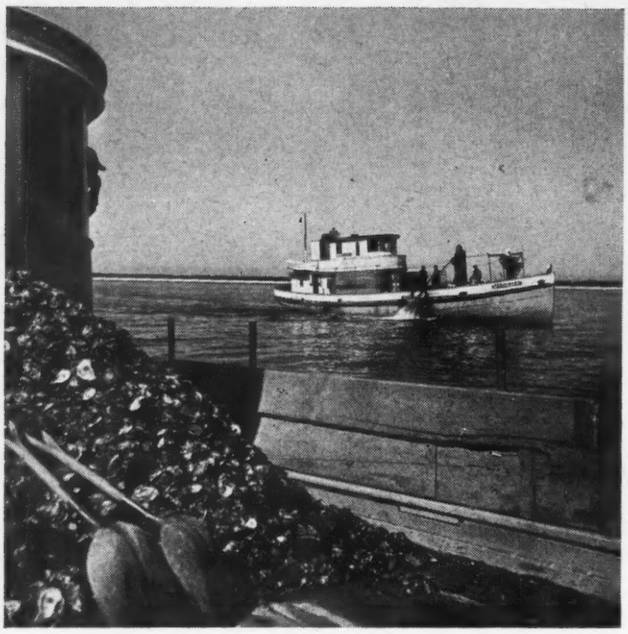
3. SALT is applied at a way-station machine along the conveyor line between the twister and the oven.



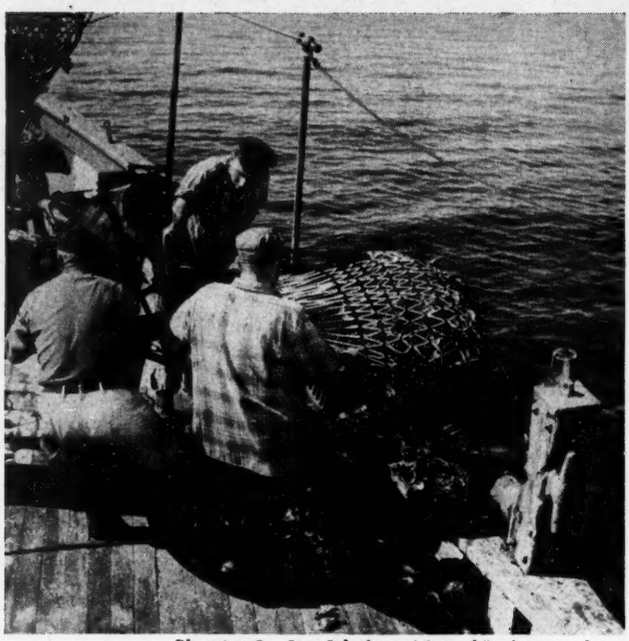
4. BAKING requires 40 minutes in this continuous oven, which has a capacity of 700 lb. per hour.



5. PACKAGING ends the continuous conveyor line. After weighing, pretzels are slid into bag-in-box type cartons.



FREE LIQUOR content or the amount of liquor exuded from oysters after shucking is influenced by the location of the oyster beds.



Bluepoints Co., Inc., Subsidiary of General Foods Corp., photos

INITIAL pH VALUE of shucked oysters varies to some extent upon the season of the year and the location of the oyster beds.

Oyster Free Liquor Content Depends Upon Cleaning Method

Methods used to clean shucked oysters before they are frozen influence the quantity of free liquor released on thawing but not keeping quality

By WILLIAM B. LANHAM, ROSE G. KERR and S. R. POTTINGER, U. S. Dept. of the Interior Fish & Wildlife Service, Div. of Commercial Fisheries, College Park, Md.

TESTS recently conducted by this service have shown that the method used to clean freshly shucked oysters influences the amount of free liquor released after thawing frozen oysters, but has no effect on the keeping quality of quick frozen oysters. Other factors such as the degree of freshness of oysters and the selection of the package have a marked effect on the quality of quick frozen oysters during storage.[1]

Cleaning Shucked Oysters

Oysters must be freed of sand and shell fragments after they are shucked and before they are packaged and frozen. In some instances oysters are washed on a "skimmer" with a stream or spray of water. In other instances oysters are agitated in a container of water. Then again, oysters are "blown" or vigorously agitated by jets of compressed air in a tank of water. After the oysters are cleaned, they are then drained and packaged.

All oysters "bleed" or exude some liquid after they are shucked. The amount of bleeding or free liquor varies, depending upon the season, method of cleaning, the location of the oyster beds and other factors.

When oysters are removed from the shell and immersed in fresh water, some water is absorbed. The amount of water absorbed is dependent, to some extent, upon the length of time the oysters are in contact with water. Recognizing this fact, the U. S. Food and Drug Administration will not permit shucked oysters to be in contact with fresh water more than 30 minutes.

If, on the other hand, the water into which oysters are shucked or washed contains not less than 0.75 percent salt, no appreciable absorption of water is likely to occur.

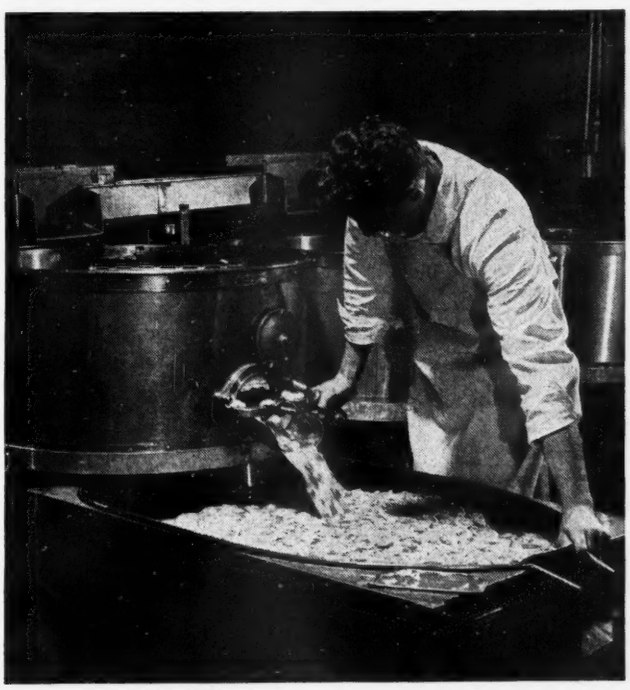
Testing of Oysters

Tests were, therefore, made to determine the effect of various methods of cleaning shucked oysters on the quality of quick frozen oysters during storage. Prepackaging treatments consisted of blowing shucked oysters in weak brine and water and also spraying them with water. Commercially prepared oysters were also obtained for comparison purposes. The quality of the treated frozen oysters was evaluated and compared on the basis of pH changes, amount of free liquor after thawing and organoleptic tests.

MECHANIZED HANDLING will assure processors of better quality frozen shucked oysters by moving them rapidly through the plant.

Bluepoints Co., Inc., Subsidiary of General Foods Corp., photos

SHUCKING does not remove all of the sand and shell fragments in oysters. Oysters must, therefore, be cleaned before freezing.



CLEANING METHODS used for shucked oysters will affect the amount of free liquor released after thawing frozen shucked oysters.

Bluepoints Co., Inc., Subsidiary of General Foods Corp., photos

PROPER PACKAGING will assure the quality of oysters after they are frozen and held for any length of time in freeze storage.

Oysters were obtained from a commercial shucking establishment in the Chesapeake Bay area and shucked on the same day. One lot was shucked into container without water and the second lot was taken, unwashed, from the first skimmer. Both lots were put up in gallon cans, packed in crushed ice and delivered to the College Park laboratory where they were divided into eight lots and treated in the following manner:

1. Oysters shucked into dry containers were sprayed briefly with water on a skimmer.

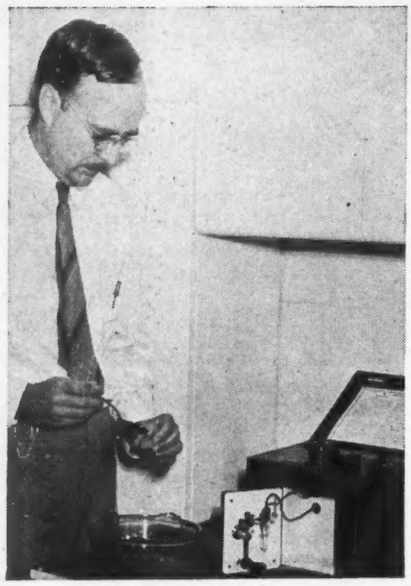
2. Oysters collected from the first skimmer were divided into six lots and blown in the following manner:

   a. In fresh water for 3 min.
   b. In fresh water for 15 min.
   c. In fresh water for 30 min.
   d. In 0.75 percent salt solution for 3 min.
   e. In 0.75 percent salt solution for 15 min.
   f. In 0.75 percent salt solution for 30 min.

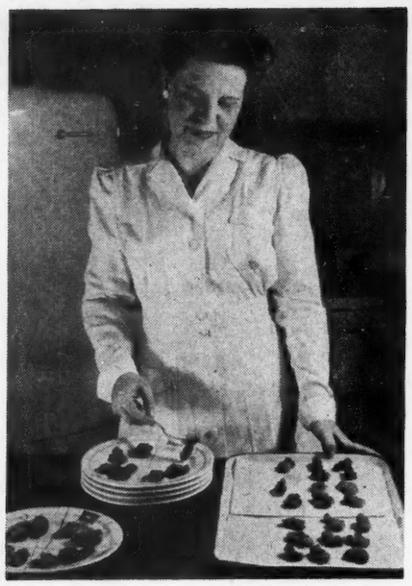
3. Oysters were prepared for packaging at the shucking house by the method commonly used in the Chesapeake Bay area.

The oysters were cleaned in a small laboratory blower which held one gallon of oysters and three gallons of cleaning liquid, drained and packaged in pint-size bag-in-box type cartons. Approximately one pound of oysters was packed in No. 300 moisture-vaporproof Cellophane bags with enough head space in the bags to allow for expansion during freezing, heat sealed, quick frozen at —20 deg. F. and stored at 0 deg. F.

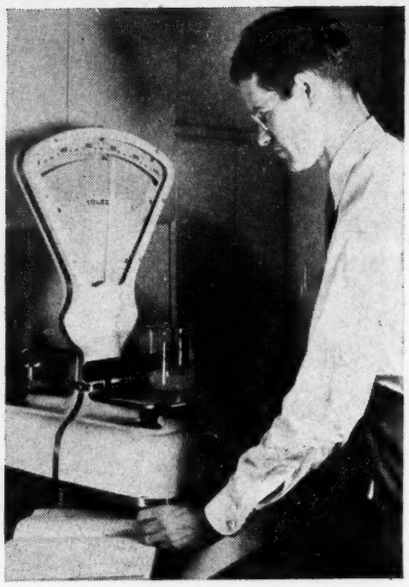
Twelve packages were prepared for each lot so that a package could be removed each month from storage and tested. Oysters were de-



THE pH VALUES of oysters, determined monthly showed no off-quality changes.



PALATABILITY of oysters was not altered on storage, despite the cleaning method.



AMOUNT OF LIQUOR from thawed oysters was influenced by cleaning method used.

frosted by holding the packages overnight in a refrigerator (40 deg. F.) and placing them the following morning in front of an electric fan at room temperature for about two hours. The packages were then opened and the contents weighed to an accuracy of 1 g. Oysters were drained for three minutes on a wire screen and the free liquor was collected and weighed. The pH value of the liquor was determined by means of a glass electrode.

On the eighth and ninth month, a different method was used to defrost the oysters. Consequently, these data were not included in the calculations and averages. For these two months, the oysters were thawed for two hours at room temperature and then held overnight in a refrigerator. Since the oysters were probably in contact with their own liquor for some time, reabsorption undoubtedly took place.

Palatability tests were made by a taste panel, which consisted of laboratory staff members who customarily include oysters in their diet and are familiar with this type of test. The oysters were prepared for the palatability tests by draining, dipping in beaten egg, rolling in fine bread crumbs and frying in deep fat for one minute in vegetable oil heated to 375 deg. F. Several samples were fried simultaneously so as to minimize cooking variations, and were served hot. Samples, designated by letters, were judged by the panel for appearance, flavor, and texture. Scoring was done on a numerical basis. Scores consisted of 3 for appearance, 4 for flavor and 3 for texture, making a total of 10 for a perfect score. Independent scores of the judges were averaged to obtain the final score for each sample. Fresh oysters, obtained at the local market, were included for comparison.

Quality Changes and pH Values

The change in pH of oyster liquor has proven, in previous work, to be a useful index in following changes in the degree of freshness of oysters. Freshly shucked Eastern oysters usually have a pH value of slightly below 7. This value decreases as freshness decreases. Oysters which have a pH value of 5.8 are generally stale. The initial pH value of freshly shucked oysters may vary somewhat, depending upon the location of the bed, the season of the year, and other factors.

In these experiments no consistent pH value change during storage was found for any of the lots and they were all of about equal quality at the end of the experiments. In most instances, there was an initial drop in pH during the first month of storage, but after this, the pH values remained relatively constant and at the end of one year of storage, were approximately the same as after one month of storage. There was no marked loss of quality as measured by changes in pH value.

Method of Cleaning Influences Free Liquor Content

The quantity of free liquor released by frozen oysters when thawed may vary with the method of thawing and method and time of draining. The method used in these tests, except for the examination made at the end of the eighth and ninth months, was one of rapid thawing and draining for three minutes. It yielded high values which might not necessarily be obtained by slower thawing and longer draining. Since the same technic was used for all packages, the results are comparable among themselves. These results are presented in Table I as percent free liquor of the entire contents of the package.

It is apparent that there is a

(*Continued on page* 234)

TABLE I—FREE LIQUOR CONTENT* After Thawing Frozen Oysters Given Different Prepackaging Treatments.

Months in storage	Treatments							
	Water sprayed	Min. blown in fresh water 3	Min. blown in fresh water 15	Min. blown in fresh water 30	Min. blown in salt solution 3	Min. blown in salt solution 15	Min. blown in salt solution 30	Commercially prepared
1	7.6	18.3	19.9	22.2	9.9	11.7	9.9	24.6
2	12.5	18.3	22.9	25.1	11.5	11.6	14.2	25.1
3	8.2	16.1	22.5	20.4	...	8.7	9.0	24.0
4	...	...	25.6	...	13.8	10.2	...	25.8
5	12.5	18.7	25.2	22.6	15.8	10.7	12.9	29.7
6	11.6	17.1	25.2	22.6	11.3	11.0	9.2	30.6
7	12.8	18.4	25.2	23.6	13.0	10.7	12.4	25.5
8**	5.5	11.7	16.1	16.8	7.3	6.2	7.6	16.0
9**	5.8	12.9	13.2	15.8	6.5	4.3	6.2	11.7
10	13.0	18.6	21.6	22.7	16.0	12.1	12.2	25.8
11	11.7	18.3	23.2	20.1	12.7	10.0	12.4	23.9
12	11.4	16.5	22.0	21.5	12.0	9.9	11.1	24.9
Average	11.2	17.8	23.3	22.3	12.9	10.7	11.5	26.0

*Free liquor is expressed as percent by weight of entire package contents.
**During these two months, the oysters were thawed slowly instead of rapidly. These figures are not included in the averages tabulated above.

EDITORIALS

COMMENT AND OPINIONS

Stroud Jordan

THE late Dr. Stroud Jordan was one of the earlier food technologists of America. A North Carolinian by birth, he is best recalled by his elegant and distinguished manners and his searching mind. No more entertaining experience could be wished than to listen to him on the witness stand at a food standards hearing during the famous Battle of the Sugars in the late Thirties. Few persons could successfully match wits with him when any soluble carbohydrate was under discussion.

One important study of Dr. Jordan's revealed that "in the good old days" before railroads the per capita consumption of sugar was just as high (when it was available) as it is today.

Tomato Juice

SEVERAL firms suffered product and financial losses in 1947 by failure to take seriously the recommendation of competent food technologists relative to methods and procedures for sterilizing tomato juice in cans. Processing conditions recommended a year ago by the National Canners Association are based on the existence of a troublesome heat resistant organism *B. thermoacidurans* that requires 0.7 minutes at 250 deg. F. (or an equivalent process) to insure its destruction in tomato juice.

While the foregoing thermal process was postulated on the presence of the trouble-maker it is true that the organism is not always present. When the organism is not present in the raw juice the manufacturer may safely use a process that otherwise would be inadequate. In fact it seems that some plants have never encountered the organism. Many a firm thus expected trouble in the autumn of 1937 when there occurrred something comparable to an "epidemic" of *B. thermoacidurans*. Where the organism comes from no one seems to know. But there it was and where adequate processes were not used the companies suffered considerable spoilage. Any of about 500 carloads have been withdrawn from the markets because of the presence of an occasional spoiled can. But up to now, no cheap method has been found to separate the good from the bad.

Back of the whole problem lies the executive policy decision of insuring vs. taking a chance. To insure requires: (a) Acceptance of the bacteriologist's recommendations that *B. thermoacidurans* may, like lightning, without warning, afflict the plant; (b) using a longer, slower process or purchasing expensive continuous processing equipment that will do the job.

Where substantial losses have been sustained it appears that the insurance feature of a *thermoacidurans* process has been omitted. This form of negative insurance can be compared to co-insuring, or to neglecting to insure at all, one's home or factory against fire or other hazards: It saves money provided there is no fire.

In the spoilage aspects of food technology the wiser course is to be fully insured against the worst that can happen. Obviously, a number of firms would be better off financially today had they employed the full *thermoacidurans* process or spent the money for continuous processing equipment.

Flour Bleaching

PROFESSOR A. J. CARLSON, the well-known physiologist, has joined the ranks of those opposed to the use of NCl_3 as a bleach for flour. He spoke recently at the symposium on alcohol of The American Association for the Advancement of Science. Commenting on possible effects of the bleach on the human nervous system, he conjectured that the material might cause those with a tendency to alcoholism to become active alcoholics.

While this comes within the realm of "important if true" it should not start a hysterical outcry against bleaching. Prolonged storage of flour will bring about a decided whitening which certainly is just as much a form of bleach as one of the surer methods employing accelerators.

If certain chemicals, however, are definitely proven deleterious, their use will of course cease. The much discussed NCl_3 in large doses undoubtedly produces ill effects in some animals. But to date, there is no clear evidence that this agent, in flour, harms humans. If such evidence were available, no one would be using the material.

In the meantime, extensive research is continuing. It is possible that NCl_3 may sooner or later be abandoned in favor of other bleaches. This may mean a change in the miller's operations but it will probably not affect the baker.

One surmises that we will continue using bleached flour, because the American people want their bread white.

It's a Processor's Responsibility

IN the current agitation by domestic common carriers and the ocean steamship companies over increasing claims for damages to goods in transit, the shipper has a responsibility that he has not always assumed. And if the agitation continues parallel with the growth of the claims for damages, it may be expected to result in drastic revision of Rule 41 of the Consolidated Freight Classification. Year by year analysis of damage claims against the railroads shows that they reached one peak in World War I of 2.9 percent of the total freight revenues, and another in

1946 of 1.6 percent. Freight revenues in 1919-1920 were about $4,000,000,000 a year; during 1945-1946 they were about $6,500,000,000 a year. While the more recent peak is not quite as high as the first one, it is indicative of a need for corrective measures.

A recent report to the Fiber Box Association by Al Luhrs, technical consultant, brings out many pertinent facts that should give pause to food processors. It seems that the railroads seldom or never notify a shipper that a claim has been paid to the consignee. Hence the former seldom realizes that his packaging may have been at fault or may need improvement unless his customer protests. Thus the shipper may be the real culprit and never realize it.

Many buyers of fiber shipping containers are not aware that many of their purchases have not met their own specification as to Mullen test. Certainly no other interpretation can be placed on sample tests made in the past two years by the railroads. Buyers are also reluctant to purchase boxes that are known to be adequate, preferring to cut corners on container costs in an erroneous belief that the cheaper box is satisfactory merely because no notice of damage has reached them.

On the other hand, shippers are at fault in many instances through use of secondhand boxes, failure to seal properly and, still worse, through shipping department's failure to prepare cars properly (remove nails, cleats, strapping, and to brace shipments properly).

As long as claims can be collected there will be little incentive to improve, but the day is approaching when more expensive boxes may be required. It would be wise for all processors of foods to do everything within their power to minimize the causes of damage that may be under their control. For, once the ponderous machinery of Rule 41 specifications has completed its work, there can be no easy revision.

To Improve Protein Food Quality

A NEW, but unfortunately irreversible way to make chicken tough has been discovered at Iowa State College by Drs. George F. Stewart, Belle Lowe and associates. The Iowa researchers have found that, whenever a chicken muscle is cut during the period between "killing" and complete stoppage of nervous activity, the cut muscle becomes so tough that no amount of cooking will make it tender. And no way has yet been discovered to reverse the process. One refrains from obvious comment on tough birds, but believes that the discovery points to the possibility of profitable researches in the preparation of animals for processing or the market.

Some years ago there was considerable skepticism when these pages carried a story that suggested the possibility of improving the flavor of pork by better methods of killing the animals. The disdained principle was that sticking a hog after lifting it on the wheel by the animal's hind leg, and thereby frightening it, was merely guaranteeing a heavy discharge of adrenalin into the struggling animal's bloodstream. If you remember the tale, pork that was electrocuted had a far better flavor than pork that was stuck in the orthodox manner.

In commercial fishing there is a comparable problem. Fish are often captured in huge numbers in the nets of otter trawls — sometimes as much as 200,000 lb. at a time. In their death struggles it is known that the fish develop abnormal amounts of lactic acid in their muscles. Whether there are other physiological effects, such as occur in pork killing, we cannot be certain, but they would not be surprising.

Processors of protein foods of animal origin should be aware of the seemingly promising fields of investigation in the art of killing. The surface has scarcely been scratched. All it needs is a desire to improve — a desire so compelling that manufacturers will put food technologists to work on the problem. The reward would be a definite improvement in quality.

Locker Plants Are Markets

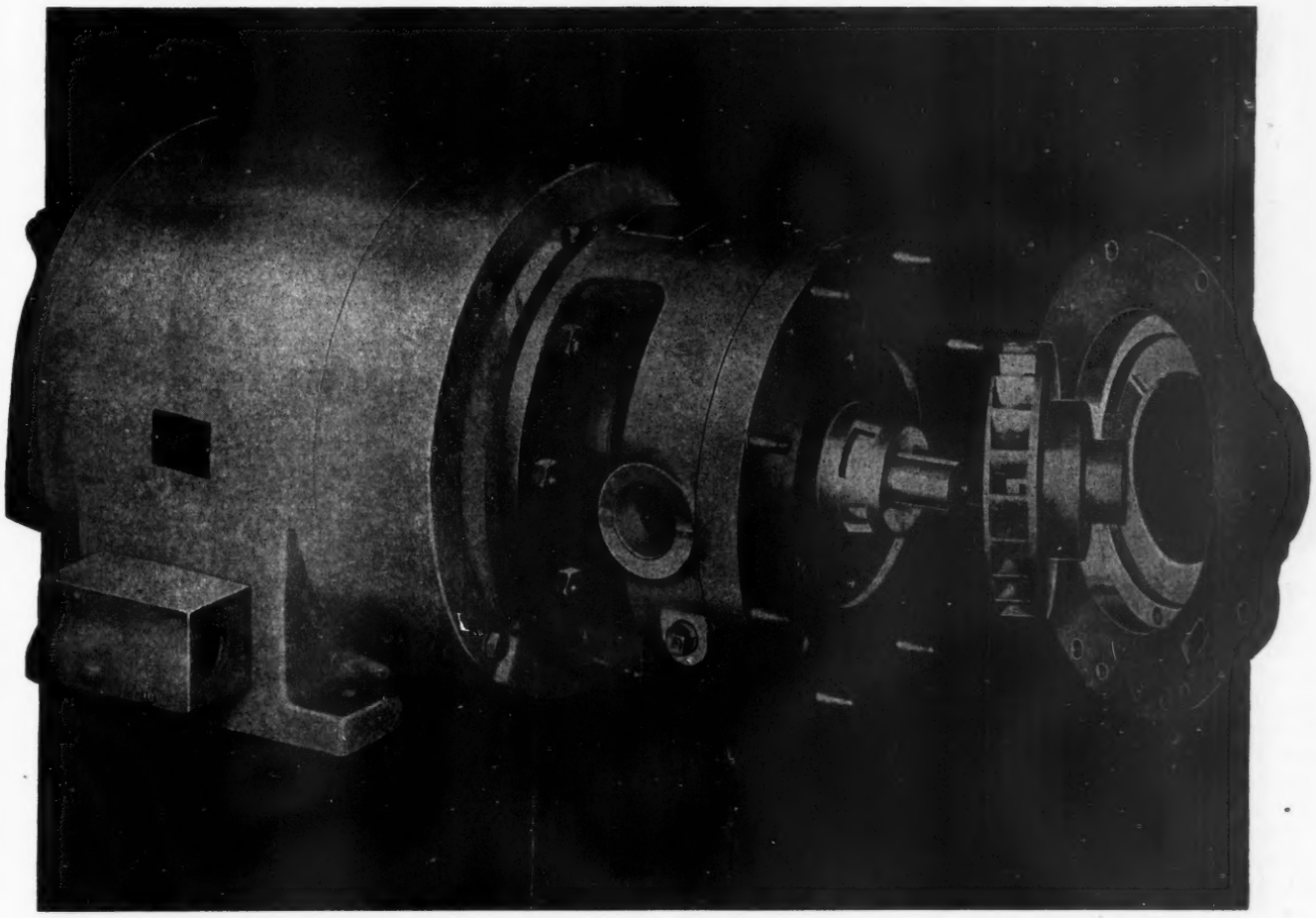
THE frozen food industry may do well to remember the prediction made in February FOOD INDUSTRIES (1947) that locker plants would become a significant market for frozen fruits and vegetables. Recent reports from a cooperative locker association in New York State indicate that the members of this group show average sales to each of their patrons of 2 30-lb. cans of fruit, $25.00 in retail size packages of frozen fruits and vegetables and over $75.00 worth of meat. This report went on to state that each of the plants in this group operated an average of 800 lockers.

While it would be distinctly unreasonable to base an average sales volume for the entire locker industry on these figures, it is noteworthy that each of the locker plants in this group have been selling around 1,600 30-lb. cans of fruit, $20.00 worth of retail size packages of frozen fruits and vegetables and $60,000 worth of meat each year.

There is no mystery concerned in the method used by this group to create such a sales volume —they advertise and merchandise their wares. The group has been using newspaper advertising and a radio program beamed to their locker patrons and potential customers. Not only has this aggressive program brought a higher volume of sales to locker patrons but it has opened new local markets by interesting hotels and restaurants, that are not equipped to store frozen merchandise, in buying and warehousing such foods in the locker plants.

In evaluating the frozen food market for the purposes of establishing a budget for an advertising program, frozen food packers should not eliminate the potential of the locker market. Like all other markets it varies in potential largely by geographical area. Yet there are large territories in which the aggressive packer could develop significant sales volume.

The Nash Clean-Air Compressor has but one simple moving part.



The Nash Clean-Air Compressor has but one moving part, cast in one piece and rotating in the pump casing without metallic contact. No internal lubrication is necessary; therefore air or other gas compressed with a Nash is entirely free from oil contamination.

Dust and heat are removed from the air, or gas compressed, by the unique Nash "Liquid Piston". Air from a Nash Compressor is therefore delivered free from dust, heat, or oil, without supplementary filters or air washers, in a perfected mechanical structure with no internal wearing parts.

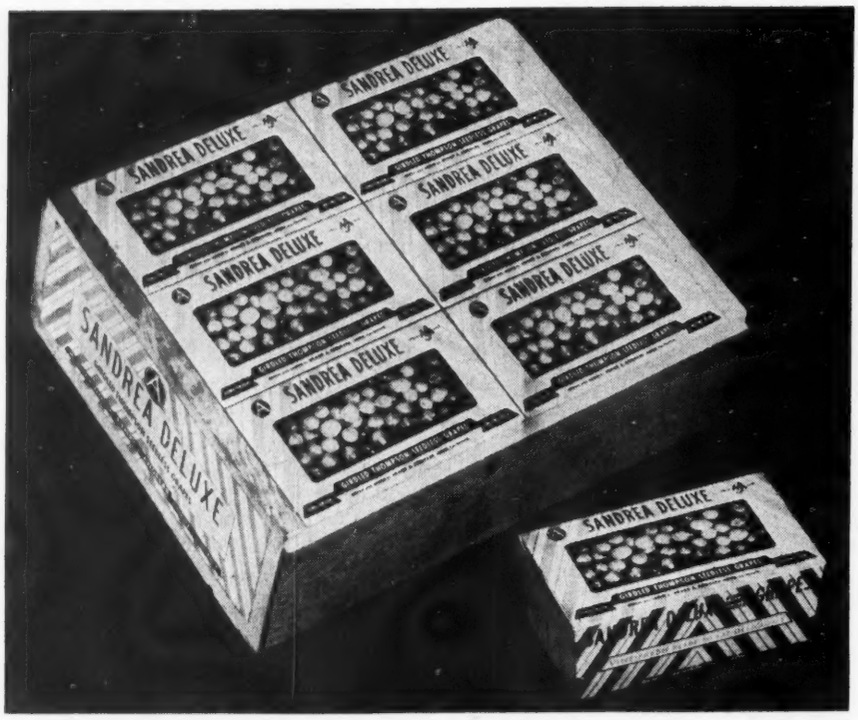
Air or gas from a Nash Compressor may be used for agitating, blending, maintaining pressure on storage tanks, or moving liquids and materials by pressure displacement, in connection with the most delicate food, beverage, or chemical process, without danger of contamination.

Bulletin D-252 tells all about Nash Clean-Air Compressors, and it is free on request.

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS



New Pack for Fancy Grapes

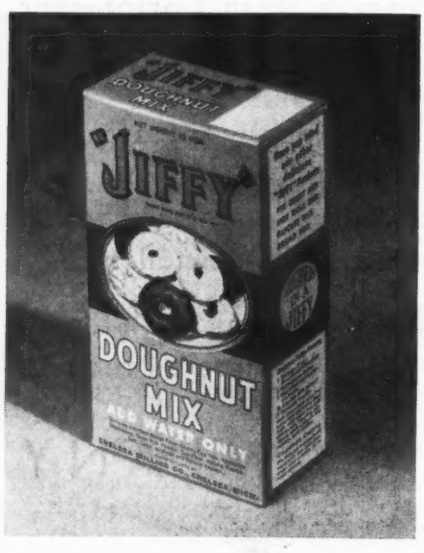
CELLOPHANE window cartons for packing grapes recently were introduced by Henry J. Andreas of Sanger, Calif. This grower produces Thompson, Red Malaga, Muscat and Emperor grapes and markets them under two brand names—Sandrea De Luxe and Bright Boy.

Sized to hold 2 lb., the colorful cartons are the result of six months of experiment and testing. They are advantageous to both the consumer and the merchant since they lend themselves well to display, contents can be seen but not touched and the containers fit conveniently into the refrigerator.

Perforations allow for ventilation and the sides are tapered to permit adequate circulation of air when the cartons are boxed for shipment.

In changing over to window cartons from baskets and lugs, it was necessary to install equipment adapted for the purpose by the General Nailing Machine Corp. of Sanger. The device, driven by a ¾-hp. motor, conveys freshly picked grapes to the packers, carries the packed fruit to the shipping room and takes the empty lugs back to be refilled.

Patent is pending on the carton.



Jiffy Doughnuts

A DOUGHNUT mix that needs only the addition of water has been placed on the market by Chelsea Milling Co., Chelsea, Mich.

Jiffy Doughnut Mix contains enriched wheat flour, sugar, egg yolk, vegetable shortening, skim milk powder, soy flour, baking powder, salt, spice, artificial and natural flavors. The 10 oz. package is said to make about 20 doughnuts.

Attractively wrapped in a light blue carton with darker blue band, the product comes complete with instructions for making many kinds of doughnuts and frostings and with lengthy directions on how to fry them.

Tinned Cheese

METAL cans are being used for several varieties of cheese which currently are appearing on grocery shelves, according to Can Manufacturers Institute. Although cheese was packed in steel and tin containers for export before the war, canned cheese on the domestic market is a new item.

Especially adapted for use by sportsmen and campers, the cheese is packed in hermetically sealed key-opening cans ranging from 1 lb. to 7¾ oz. in size. The canned cheese requires no special refrigeration and may be stored on the closet shelf.

Types of cheese currently available include American Cheddar, Gruyere, Cheddar blue, Trovolone and smoked cheese. Kraft Foods Co., Chicago, and Zausner Foods, Inc., New York, are among the companies presently canning cheese.

Frosting or Fudge?

KITCHEN ARTS FOODS, INC., Chicago, has made its contribution to the ever-growing number of chocolate flavored cake frosting and fudge mixes with the introduction of the product under its Py-O-My label. Add only water to this one.

These Cocktail Tidbits Are by Zed

HAVING manufactured only one item, since 1939, Pretzel Bitz Corp., Bluffton, Ind., added the "by Zed" line of cocktail items.

The company says the tidbits are new and different and the result of much research and experimental effort. The latter is credited to Harry A. McFarren, Jr., and Robert Ehler, general manager and plant superintendent for Pretzel Bitz.

The various cocktail items presented are chocolate cookie sticks, Pretzel Bitz, Cheese Bitz, celery and onion cocktail sticks, cheese cocktail sticks, soya cocktail sticks and tomato cocktail sticks.

The manufacturer states further that these products are baked in the company's specially constructed Infra-red ovens.

The "sticks and bitz" are packed in glass jars with screw tops. Pasted paper labels present a simple lace doily effect with just a few words printed on the front.

Canned and Bottled Foods in Gift Pack

P. J. RITTER CO., Bridgeton, N. J., is gift-packing 16 of its choice canned and bottled products in a special presentation chest which may be used for keeping silverware, stationery or sewing.

For the convenience of those giving Pleasure Chests as gifts, Ritter handles all details of the shipping direct to the recipient, enclosing a gift card bearing the donor's name. Special quantity shipment prices are granted on shipments of 25 or more chests going to one address.

The Pleasure Chest will be available the year round. It contains tobasco-flavored catchup, whole tomato catchup, three jars of chili sauce relish, two jars of pork and beans, two cans of baked lima beans, two cans of asparagus, two jars filled with roasted peppers and, finally, three cans of farm-style vegetable soup.

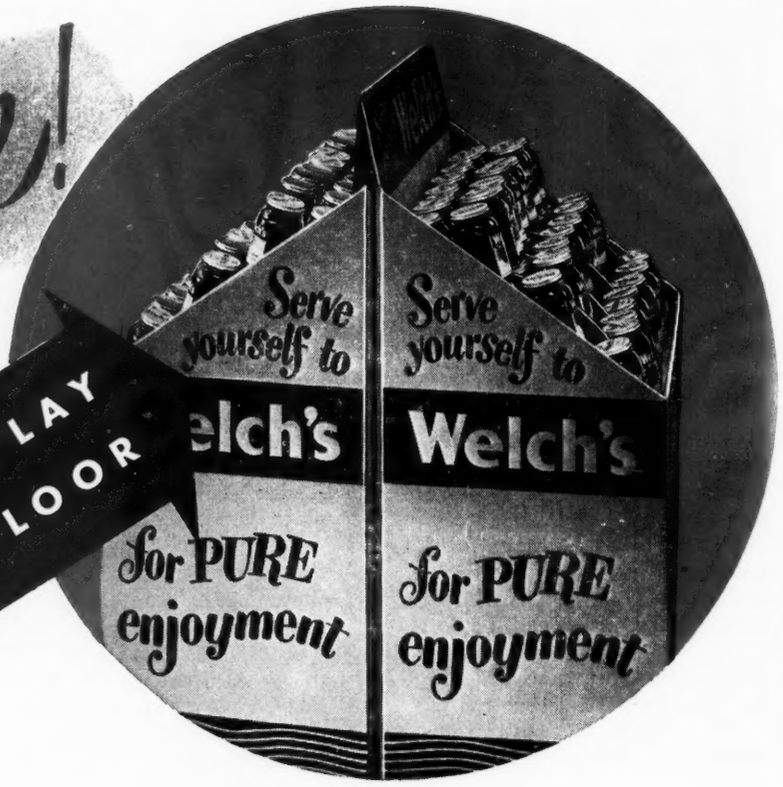
A complete line of boxes, wrappings, bags, envelopes, glassine, cellophane, pliofilm and laminated papers, etc., for dry or frozen foods. Stock or original packages designed. Send your packaging problems to us today.

WRITE FOR INFORMATION

PACKAGING DIVISION
E. W. Twitchell Incorporated
777 Public Ledger Bldg, Philadelphia 6, Pa.

Sales Galore!

WITH A GAIR DISPLAY ON THE DEALER FLOOR



Welch Grape Juice Company reports that retail sales were doubled when Welch preserves, jams and jellies were displayed, adjacent to the cash register and along busy traffic lanes, in a ROBERT GAIR "sales promoting" FLOOR DISPLAY STAND.

This impressive sales record is a tribute to the cooperation and ingenuity displayed by the Robert Gair organization . . . and the creative staff is proud of the fact that they played an important role in increasing the sales of Welch preserves, jams and jellies.

GAIRanteed Floor Display Stands are artistically designed, sturdy, foolproof and easily assembled. They are economical and when properly displayed they yield generous advertising and sales promotion dividends..."SALES GALORE WITH A GAIR DISPLAY ON THE DEALER FLOOR".

Write for complete information about GAIRanteed Floor Display Stands

GAIR

ROBERT GAIR CO., INC. **NEW YORK • TORONTO**

PAPERBOARD • FOLDING CARTONS • SHIPPING CONTAINERS • Vus EXPORT CONTAINERS

For Fresh Produce

VENT-VU is the name of a new paper bag designed for use in prepackaging bulk fruits and fresh vegetables at the shipping point, according to an announcement from Union Bag and Paper Corp., New York, the manufacturer.

Made of wet strength paper which can absorb a great deal of moisture without breaking, the unusual feature of the new bag is a window of cotton mesh through which the contents can be seen. The bag provides product protection, visibility, air circulation and clearly printed brand identification. If desired, an advertising message can be included since the bag has three uninterrupted sides on which to print.

A special moisture-resistant adhesive was developed by Union Bag to bond the mesh strands securely between the paper walls. The bags are entirely machine made of two or more layers of paper on high speed bag machines, and printed at the same time.

The bags can be had either with or without handles. Union Bag is producing the Vent-Vu bags in large quantities for packs varying between 5 and 15 lb. of onions, potatoes, apples, oranges and other bulk fruits and vegetables.

Canned Ambrosia

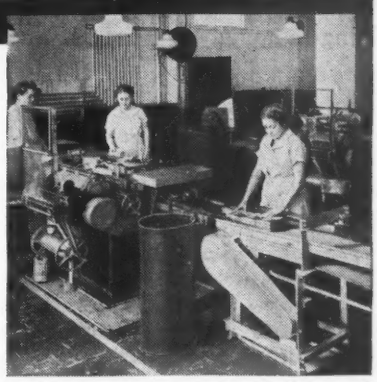
AMBROSIA, in the manner of Mitchell Canneries, Fort Meade, Florida, is being distributed currently on a nation-wide scale under the name Deep South.

A special process is said to maintain natural appearance and flavor of the canned product. Its inventors are Robert Flowers of Mitchell Canneries and John I. Thompson of John I. Thompson & Co., Washington, D. C.

Ambrosia usually consists of orange slices with shredded coconut sprinkled over the top. The canned version, however, include pineapple and grapefruit.

"BRISK" wrapping for LIPTON

THE "BRISK" TEA



Our quickly adjustable Model FA machines wrap all of the various sizes of LIPTON TEA packages illustrated above.

Like other leaders in the package goods field, LIPTON has standardized on "PACKAGE" machines . . . Because they're FAST... Quickly adjustable for a wide range of package sizes . . . So well built and dependable . . . And because they produce *packages that sell*—uniformly perfect wraps in keeping with the uniformly high quality of the product.

Look to "PACKAGE" for the latest and finest in wrapping equipment.

Our line comprises over 80 standard models, designed to meet practically any wrapping requirement. Why not get in touch with our nearest office?

Write for our folder "Packages That Sell"

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts

NEW YORK CHICAGO CLEVELAND ATLANTA DENVER
LOS ANGELES SAN FRANCISCO SEATTLE TORONTO

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

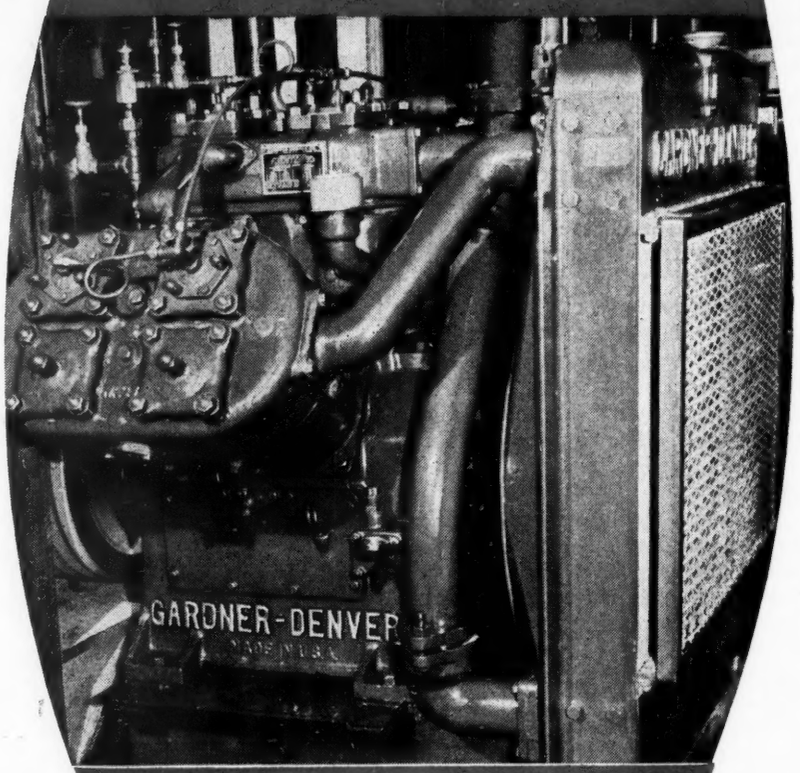
You get ALL THREE with a "WB" . . .

- Greater air output
- In less space
- At lower cost

Gardner-Denver "WB" Vertical Compressors have the compactness you need for installation in limited space . . . yet because of their special design, these compressors have high efficiencies. Air output is much greater than that obtained with single-stage compressors of equivalent piston displacement. All cylinders are completely water-jacketed, assuring reliable operation in any temperature and at any altitude. Other valuable "WB" features are:

- *Combination radiator and air-cooled intercooler permits use where cooling water is scarce or of poor quality.*
- *Completely water-jacketed cylinders for maximum operating efficiency in any temperature or at any altitude.*
- *Duo-Plate cushioned air valves—simple, durable, unusually quiet.*
- *Timken tapered roller main bearings.*
- *Crankcase of GarDurloy alloy—completely enclosed, dust tight, oil tight.*

For complete information, write Gardner-Denver Company, Quincy, Illinois.



Gardner-Denver "WB" Two-Stage, Water-Cooled Compressor

GARDNER-DENVER
SINCE 1859

The coconut is treated to prevent the presence of free lumps of cocoa butter and to inhibit it against the darkened appearance normally prevailing after heat processing, according to the producer. It is then added to the fruits by a regulated procedure in order to obtain the appearance and flavor which results in the product's freshly-prepared characteristics.

Could Be Goo

BURGOO, a favored dish of Kentuckians, is now available to other Americans through the courtesy of Morton Packing Co., Louisville, Ky.

Morton packs the meal in a 16-oz. can. It resembles a stew or thick soup. Kentuckians claim it is neither. Ingredients include beef, chicken, vegetables and a secret seasoning, all of which are simmered in large kettles for many hours.

Available in vacuum-packed cans of various sizes for use in hotels, restaurants and homes, Burgoo may be served in casserole with crackers or rolls and butter, with potato chips and sandwiches or over rice or noodles.

Foiled Cheese

A STRIKING foil cheese package has been fabricated by Milprint, Inc., Milwaukee, for John O. Widmer and Sons, Theresa, Wis.

The wrap is made of .00045 aluminum foil wax-mounted to 16-lb. sulphite. A protective lacquer coating on the foil's two sides guards against seepage of the natural acids and salts found in cheese.

Besides being highly protective, the package lends merchandising emphasis through its pleasing design against the naturally attractive foil background of gold. Royal blue and maroon lettering are used for good contrast.

Custom Built
STAINLESS STEEL EQUIPMENT....

...is ONLY AS GOOD AS ITS FABRICATOR

From the minute you decide on a made-to-order stainless steel vessel, you're in the hands of a fabricator. In fact the selection of your fabricator is generally one of your big problems.

It's more than a question of following blueprints. Stainless steel is a difficult alloy to work. It "acts up" during fabrication. In cutting, forming, welding and even in finishing, your fabricator must know how to guard the corrosion resistance and strength of the alloy. His plant must be specially equipped for working with stainless steel. The longer his experience, the more help he'll give you in building vessels that meet your requirements.

We work exclusively with stainless steel and alloys. Our plant is specially tooled to fabricate this metal. Our engineers and mechanics are particularly trained for the work. Why not consult us when you plan your next stainless steel vessel?

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S. BLICKMAN, INC.
Guards Alloys in Fabrication

SEND FOR THIS VALUABLE BOOK
A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

"You've never tasted Cremo?"

"It's Swell! *We have it often at our house on all kinds of desserts, and sometimes Mother uses it on cakes . . . it makes the best frosting."*

Yes, busy mothers find countless ways to use this smooth, creamy marshmallow. It adds tempting variety to menus, with special appeal to youngsters.

The Crown Screw Caps used as closures on this product are attractively lithographed in three colors to harmonize with the distinctive Cremo label design. Extended to include the full depth of the skirt, this decoration definitely enhances the sales appeal of the package.

But these caps have more than beauty. They have the uniformity that assures trouble-free application on production lines. They have liners that are carefully selected to give maximum protection to specific products. And, of course, they have the exclusive Crown Deep Hook Thread construction. Crown Cork & Seal Company, Baltimore 3, Maryland. *World's Largest Makers of Metal Closures.*

Cremo is a product of The Cremo Manufacturing Co., Philadelphia, Pa.

CROWN CLOSURES

FOOD INDUSTRY NEWS

WAGE-HOUR STATEMENT DEADLINE NOW FEB. 16

PERSONS and companies who want to file statements with the Department of Labor regarding the proposed revision of the wage-hour definitions of executives, administrators, professional persons, supervisors, etc., have been given until February 16 to do so.

Hearings have been under way since early December on a proposal of the wage-hour administrator to re-define the activities and duties that put an employee outside the provisions of the wage-hour law, such as the requirement for paying overtime for work-weeks longer than 40 hours. Under the law, the administrator has the power to define what constitutes an exempt employee, and thus administratively expand or contract the effect of the law.

During the six weeks of hearings, which ended in mid-January, many representatives of the food industry were heard. These included representatives from most of the food processor associations.

Major interest at the hearings centered around the proposal of administrator W. R. McComb to permit the exempt employees—roughly, supervisors—to work not more than 8 hours a week at non-exempt (or non-supervisory) work. Present regulations permit supervisors to work up to 20 per cent of their time on non-exempt activities. The minimum salary requirements are $30 per week for executives and $200 monthly for professional and administrative workers.

Bakery Package Studies Undertaken by Council

TWO of the most comprehensive studies of packaging ever undertaken for the bakery industry were recently announced by the Laminated Bakery Package Research Council. They are for the purpose of determining the most effective methods of packaging a variety of bakery products, including buns, cakes, doughnuts, cookies, sweet yeast-raised goods, etc., and are scheduled to begin early in 1948.

The studies will be concerned with two broad aspects of bakery product packaging—the physical properties of the package and its merchandising appeal. Both projects are sponsored by the Council, recently established by the Laminated Paperboard Package Association to study packaging problems and correlate and disseminate information gained in research.

Studies in the physical phases of product packaging will be conducted by the American Institute of Baking, under the supervision of Dr. William B. Bradley.

Each type of packaging material will be tried on a variety of bakery products. The value of the packaging material studied will be determined by whether it offers adequate protection against handling damage and moisture loss, whether it adversely affects flavor, the degree to which it may prevent staling, and its relative cost.

GMA Information

PROMOTION of Hazen H. Morse, Jr., to the post of director of information was recently announced by Paul S. Willis, president of Grocery Manufacturers of America, Inc.

Mr. Morse joined GMA's Public Relations Department in April, 1946, and has been handling trade and press relations for the association since that time. A Naval veteran, he was executive editor of Grocer-Graphic, New York City trade newspaper, until he resigned to accept the GMA post.

Florida Citrus Group Forms Canners League

A GROUP of 30 Florida citrus canners have formed the Canners League of Florida, a new organization to unite the members in a policy of "disseminating factual information, high quality products, and fair profits to growers and canners alike."

C. Howard Sweatt, of Besco Products Co., Orlando, is the new president. Vice-presidents include Rouss May, of Hills Brothers Co., Bartow; Logan Bloodworth, of Cherokee Products Co., Fort Pierce, and J. Adams Bruce, of Bruce's Juices, Tampa. Charles McCartney, of Stokely Food, Inc., Tampa, is treasurer.

Homer Hooks, of Lakeland, has been named secretary-manager and will maintain headquarters in the Cole Building, Lakeland.

C. E. Lindsey, president of Lakeland Highlands Canning Co., and Walter L. Graefe, president and treasurer of Pomono Products Co., Clermont, two former presidents of the National Canners Association, are members of the executive committee. Others on the committee include M. C. Peters, of the Florida-gold Citrus Corp., Lake Alfred, and B. C. Skinner, of Juice Industries, Inc., Dunedin.

Wide World

SAHARA STRIP BECOMES FARMLAND

The hot sands mixed with mud brought from the Nile, 20 miles away, and irrigated by the water of a nearby canal fed with water from the Nile, this experimental farm, only 12 miles from the Giza pyramids, has been made to yield a rich harvest.

Tomato Juice Spoilage Discussed At National Canners Convention

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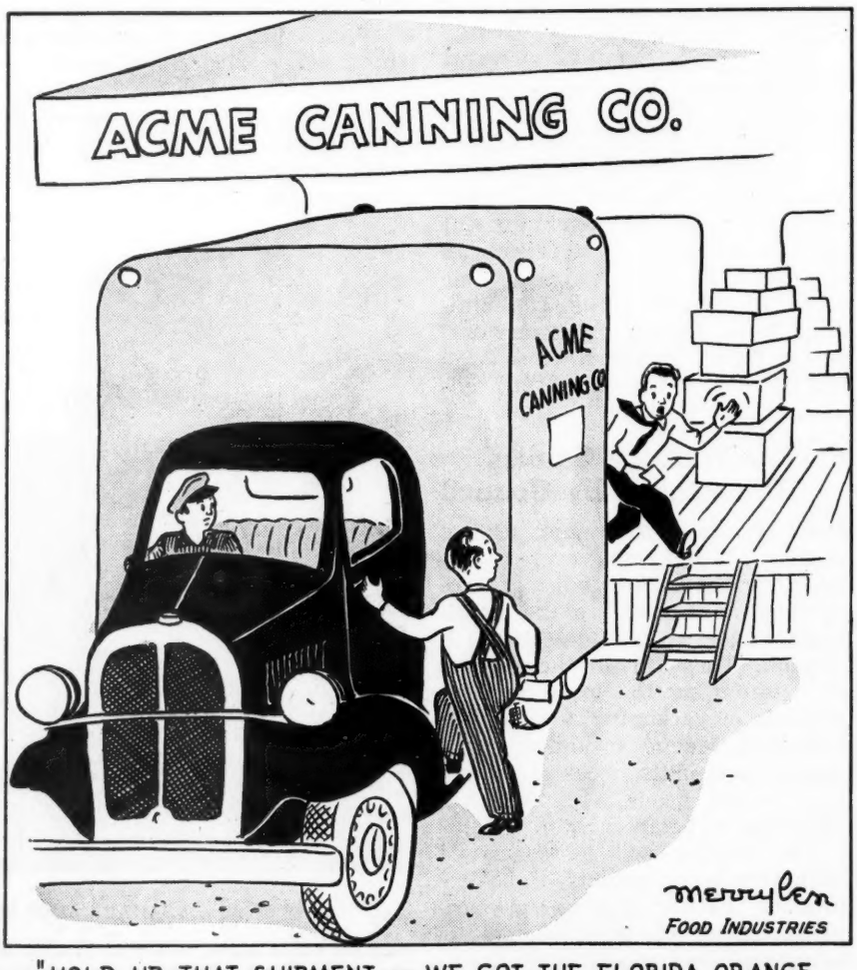

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A NEW BOOK ON

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By
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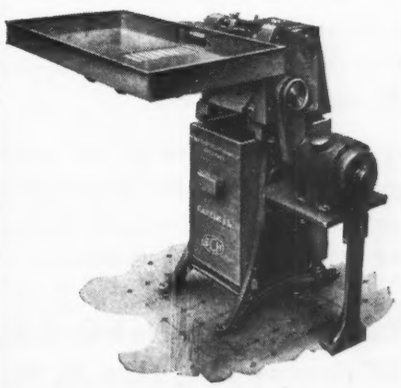

The "Turnbull" type ORANGE PEEL CHIPPING MACHINE manufactured by Wm. Brierley, Collier & Hartley, Ltd., Rochdale, England.

Write for details.

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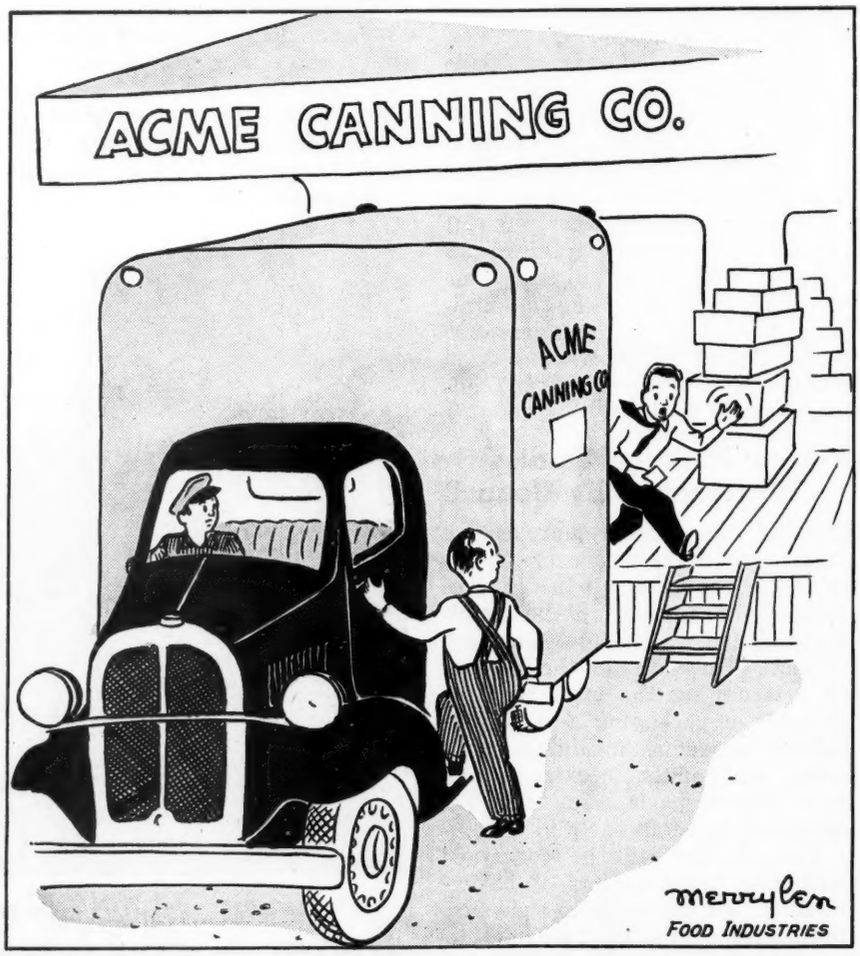

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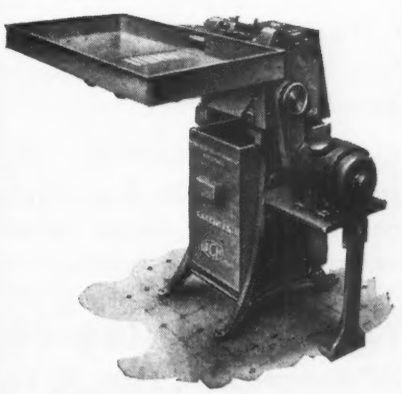

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AMA's Packaging Show Set For Late April

THE American Management Association is moving its packaging exposition to a five-day schedule, at the 17th annual meeting, to be held in Cleveland's Public Auditorium, April 26 to 30. Approximately 200 exhibitors are expected to utilize 100,000 sq. ft. of display space in this first midwest gathering in four years.

The conference on packaging, packing and shipping will continue on a three-day schedule as in previous years. More than 1,000 packaging executives, engineers and technical experts—members of AMA's packaging division—will discuss materials, methods, procedures and merchandising on April 27 to 29.

Sugar Corp. Abandons Clewiston Starch Plant

UNITED STATES SUGAR CORP. has abandoned the huge $8,300,000 plant at Clewiston, Fla., for the manufacture of starch from sweet potatoes. The plant, the largest of its kind in the United States, failed to produce the amount of starch necessary for profit, the official statement indicated.

Failure of the project is understood to be due to an error in figuring the productivity of the soil, which yields rich crops of sugar cane and winter vegetables, but failed to produce adequate amounts of sweet potatoes. Anticipated production of sweet potatoes ranged from 40,000 to 50,000 lb. per acre, but actual harvest of two crops yielded only about 10,000 lb. per acre.

Container Institute Publishes Food Study

THE QUARTERMASTER FOOD AND CONTAINER INSTITUTE has published an operation study entitled "Fruit and Vegetable Products." The publication is Volume IX of a 13-volume "Report on Wartime Problems in Subsistence Research and Development."

The 108-page book includes chapters on The Fruit and Vegetable Products Branch of the Food and Container Institute, vegetables, dehydrated soups, fruits, and fruit juices. It deals with fruit and vegetable research and development performed by the Institute to the close of the war in August, 1945.

"Fruit and Vegetable Products" was written by Major Matthew E. Highlands, Major Hatton B. Rogers, Jr., Captain Jules Novick, Captain Walter S. Richert, and Mr. Ray W. Kueneman, all members of the Food and Container Institute staff during World War II. The material was edited by Captain Hewitt A. Conway and Miss Alice I. Meyer.

Because of the limited number of copies available, distribution will be made without charge at the rate of

Press Association

ENGLAND'S FOOD

England's Women's Land Army has a champ in Miss P. Bentley, who is shown here driving a five-furrow tractor plough. The "army" has been rebuilt to repeat its wartime food battle.

one copy each to technical and scientific libraries, military agencies, and firms in the subsistence field. Requests on organization letterhead should be sent to the Chief, Technical Information Office, Quartermaster Food and Container Institute for the Armed Forces, 1849 West Pershing Road, Chicago 9, Ill.

P.A.F. Takes Over Cedergreen and Polar

PACIFIC AMERICAN FISHERIES, Bellingham, Wash., one of the largest packers of Alaska salmon, has joined with Cedergreen Frozen Pack Corp., Wenatchee, Wash., to reorganize the bankrupt Polar Frosted Foods, Seattle. The deal was consummated December 23 with the assent of two-thirds of Polar's creditors.

Polar Frosted Foods, listing assets and liabilities at $3,095,000, filed under the federal bankruptcy act last May. Under the court plan of reorganization, Pacific American puts up $400,000 for an issue of Cedergreen preferred stock and also obtains enough newly issued common stock of Cedergreen to obtain majority control. Cedergreen then puts up $400,000 for a new issue of Polar common stock, and a slate of Pacific American and Cedergreen directors take control.

Approximately $1,000,000 in general claims of Polar creditors will be ultimately paid off at about 50 cents on the dollar—10 cents in cash and the remainder in new stock.

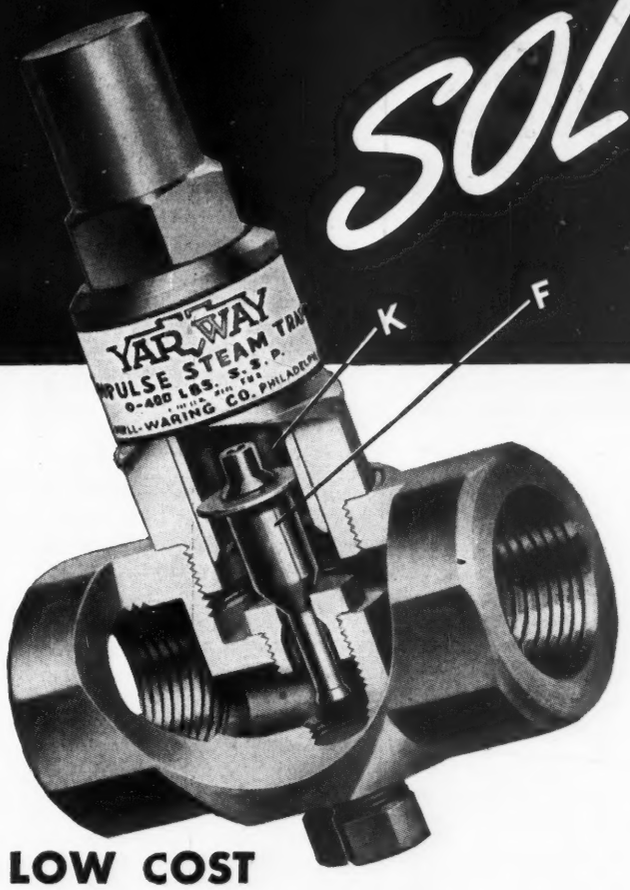
Brooklyn Polytech Gives Wine Course

SINCE New York is an important center for wine, fermentation and distilling industries, the Polytechnic Institute of Brooklyn will offer a new course, "Technology of Alcoholic Beverages" in the Department of Chemical Engineering during the spring semester which commences February 2, 1948.

Dr. Morris B. Jacobs, chief organic chemist in the Research Laboratory of the New York City Department of Health, and adjunct professor in the Department of Chemical Engineering of Polytechnic, will present the course, which covers the methods and processes used in the manufacture of the various alcoholic beverages.

Offered on the graduate level, the course will be of interest to those who work in the beverage industries as well as to students who are working for their doctoral degrees in chemical engineering.

OVER 550,000 SOLD



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THE PROCESSING PICTURE

Butter Process Faulty, ABI Meeting Is Told

CURRENT research problems, plant sanitation, quality control and continuous butter-making were the principal subjects discussed at the 39th annual meeting of the American Butter Institute, in Chicago, November 19 and 20.

The research committee and the cream quality committee reported on the study of extraneous materials in cream and butter. It has been found that air is the major source of objectionable extraneous material. Contamination starts at the separator spout and is supplemented by all the utensils used. Points to watch are: (1) Proper utensil care including thorough washing and scrubbing; (2) location of milk house and barrel, tightly enclosed rooms being the most satisfactory; (3) systematic scrubbing of route trucks and cream stations, at least twice a week, and (4) use of a centrifugal separator to obtain clean cream.

Dairy Waste

O. W. Sandborg, Armour and Co., chairman, dairy waste disposal task committee, reported that a research project has been started at Michigan State College to study the problem of dairy waste disposal. Cost of the project is estimated at $10,095, and funds from the dairy industry committee will pay for construction of a pilot plant and necessary equipment.

Michigan State College will supply the supervisory and operating personnel for this project which will be under the direction of research professor E. F. Eldridge.

In addition, a $15,000 per year project will be undertaken at the Eastern Regional Research Laboratories in Philadelphia. The destruction of milk solids by aeration, aerobic fermentation, and the use of oxidizing agents such as chlorine will be studied. The study will also include yeast, bacteria in pure and mixed cultures and protozoa.

Continuous Butter Making

G. W. Shadwick, Beatrice Creamery Co., in his research committee report summarized the conclusions reached on the shortcomings of the German Roth continuous butter churn. This machine, according to the committee, although found to be impractical, did stimulate the development of continuous churns by American manufacturers, which hold considerable promise.

Russell Fifer, executive secretary, stated that the first year following the termination of price controls has demonstrated that the butter industry will eventually regain its former position in the dairy industry. The gain in butter production during 1947 has been 15 percent above 1946 levels. Should this volume trend be maintained,

STATUE OF A FRIEND

Celebrating its 25th anniversary, the Food Research Laboratories, Long Island City, pay tribute to an oversize likeness of their greatest benefactor. Dr. Bernard L. Oser, vice-president and director of the laboratories, and Miss Mona Oser were not in the least perturbed by the absence of an injection needle at the unveiling.

the industry will continue to advance to even higher than prewar levels of production. The total butter production during 1947 was reported to be 1,350,000,000 lb. as compared with 1,150,000,000 lb. in 1946. Holdings in storage on last November were 55 percent below holdings on that date in the 1935-39 period.

The following officers were elected:

President, George Mahle, president, Sugar Creek Creamery Co., Danville, Ill.

Vice-president, E. J. Davidson, vice-president, Wilson & Co., Chicago.

Russell Miller Begins Operation of New Mill

RUSSELL MILLER MILLING CO., Minneapolis, has begun operation of its new flour mill in Alton, Ill. built to replace the one destroyed by fire, March 16, 1946. Capacity of the mill is 10,000 cwt. of flour daily; 6,000 cwt. for hard wheat flour and 4,000 cwt. for soft wheat flour. Its capacity for bulk flour storage is 60,000 cwt. Track facilities permit loading of 30 freight cars at one time.

The nine-story building is completely air conditioned; has glass blocks for windows. Special engineering throughout the mill gives thorough protection against insect and rodent infestation.

Also included is a modern packaging department for small packages of family flour, cake flour and specialties. Sixty brands of flour are packed and more than 300 persons employed.

Modify Process For Starch From Sorghum

WET milling sorghum grains for the recovery and purification of starch by a modified process is being done at Kansas State College, Manhattan, Kan., under the direction of W. H. Honstead, acting head of the chemical engineering department. Starch extracted from sorghum grains is used in baked goods, sirups, dextrose, paper, insecticides and adhesives.

Prof. Honstead predicts that a new industry will develop in medium sized Kansas cities producing an edible oil, a high-protein livestock feed, starch and wax from the sorghums grown in Kansas. Wax is a by-product from the wet milling process, which was heretofore lost when the corn process was employed for sorghum grains. Now 1 lb. of wax can be recovered from 400 lb. of sorghum.

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All we ask in return is a few minutes during the flight to explain to you how the 150 mph *Navion* costs no more than a car to drive, and how businessmen everywhere are finding that this rugged, safe, easy-to-fly plane is a money-maker for them.

You are, of course, under no obligation to us. If you're interested in either a business trip or an airport demonstration, drop us a note on your business letterhead, and we'll have our nearest dealer get in touch with you.

NEW Navion By RYAN

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Press Association

FRIENDSHIP FOOD REACHES FRANCE
A carton of the food gathered by the Friendship Train reaches its destination. This one wound up at a school for young girls in Vitry, a suburb of Paris, on December 30, and was the first of this contributed food to be distributed.

Canada Bans Imports While Cutting Duties

TYPICAL of the problems confronting revival of export markets for food products is Canada's ban on many of products she normally imports from the U. S., at the same time that she was granting reduced duties on identical products. The reason is the same shortage of dollars that has forced Mexico, Czechoslovakia and other countries to do likewise.

Canada has been by far the largest single export market for many U. S. fresh and processed fruits and vegetables. For instance, Canada took 65 percent of the fresh oranges exported by the U. S., 49 percent of the canned fruit juice exports, and 33 percent of peanut exports during the year 1946-47.

Canada has banned imports of all fresh fruits, except citrus fruits, apples and bananas; all fresh vegetables, except tomatoes and onions; dates and other dried fruits; poultry, eggs, meat and meat extracts; packaged foods, such as breakfast foods; milk; pickles; spices; roast coffee; beans, peas, rice, peanuts, and peanut butter; cocoa products; oysters, crabs, clams, shrimps; honey, molasses, and sirup.

On other food products, which were not specifically banned, Canada has set up quotas that did not exist before. For instance, fruit sirups and fruit juices, while not banned entirely, are permitted to be imported only in quantities drastically below Canada's normal annual imports of these products.

The import barriers may be subject to revisions on specific products as the effects of the ban become apparent in Canada. However, it is a question whether this "temporary" measure, designed to conserve Canada's dwindling stock of dollars, can be relaxed within a year. Much depends on the success of the European Recovery Plan—for Canada's dollar supply in years past also flowed from European countries to which she sent a large share of her exports.

Study Cannery Waste Conversion to Alcohol

SOME of the nation's cannery waste problems will be solved, according to the department of information at Washington State College, Pullman, Wash., if experiments now underway at Washington State prove successful. Dr. William A. Pearl, director of the Washington State College Institute of Technology, says the ultimate aim of the project, now in its first laboratory experimental phase, is to convert waste products of the canneries and waste from the orchards into marketable, industrial alcohol and high grade protein-rich stock feed.

S. L. Adams, fermentation expert from Louisville, Ky., head of the fermentation section research

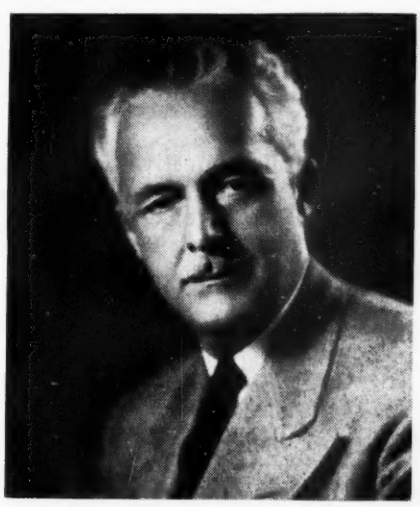
division of Joseph E. Seagram & Sons, Inc., will attempt to apply Seagram's continuous fermentation process to the cannery and orchard waste products in an effort to solve the problem. He was loaned to the college by Seagram.

"If experiments are successful, stream pollution problems of canneries will be eliminated, the fruit growers' waste problem will be solved, and a new industry may boom in the industry-conscious Pacific Northwest," Dr. Pearl said.

Margarine Makers Hope To End Taxes This Year

MARGARINE manufacturers say that this session of Congress offers the best chance they have ever had to bring about repeal of the federal laws taxing the distribution of colored margarine.

Continued high cost of butter, and food in general, means that the Republicans in Congress are going to be most receptive to legislation that will add to their anti-inflation record. It is agreed by the margarine interests that repeal of the federal laws will not bring the price of margarine down.. But they do feel that if the present taxes are repealed, the Republicans will have acted to make it easier for many housewives to buy margarine.



DR. STROUD JORDAN

Prominent in the food industry since 1920, Dr. Stroud Jordan, 62, chemist in charge of manufacturers' service division, the American Sugar Refining Co., died in Miami, Fla., December 28, the victim of a heart attack.

Dr. Jordan joined Henry Heide, Inc., in 1920, as chief chemist. In 1930 he became managing director of Applied Sugar Laboratories, New York. From 1934 to 1938 he was chief of the bureau of standardization of the New York City department of purchase. It was in 1938 that he joined American Sugar. Dr. Jordan took an active part in the Institute of Food Technologists from the time that group was organized, and served as president of the New York section during 1943-44.

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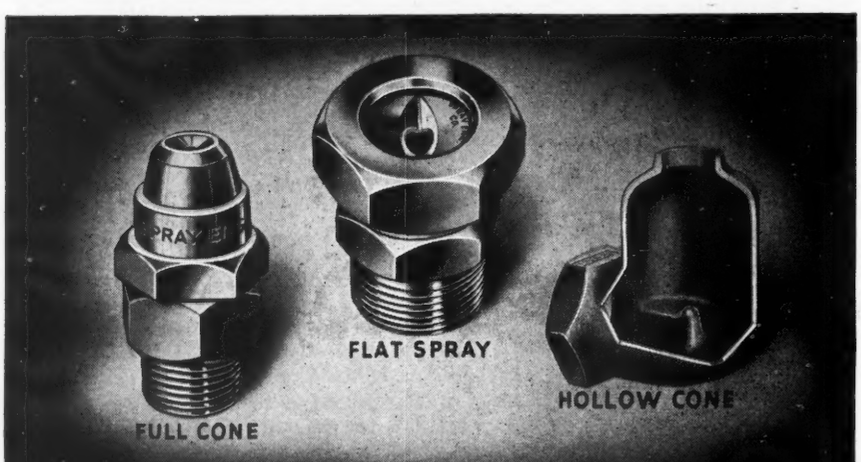

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Fig Canning Method Perfected at U. of C.

A NEW way to preserve dried figs, using tin cans as containers, has been perfected by food technologists in the University of California College of Agriculture for use by fruit packers.

The improved dried fig specialty is made by heating the figs in a diluted, refined corn syrup almost to boiling for about one hour, draining, canning in key-top cans, sealing, and sterilizing for 45 minutes at 212 deg. F. A sample canned three years ago was still in good condition when opened recently.

The figs do not sugar or dry out in hermetically sealed cans, says Dr. W. V. Cruess, food technologist, who developed the method with two graduate students. The key-top can is easily opened and also is insect-proof. The tender figs are excellent for eating out of hand as a confection and are quite inexpensive, he adds.

Canned figs also have a much longer storage life, especially in hot, moist climates, than figs preserved in other ways, Cruess points out. However, under normal storage conditions, the usual carton method is highly satisfactory for several months and it costs less.

Jelly Standards

THREE grades of fruit jelly have been formally established by the Production and Marketing Administration of the U. S. Department of Agriculture, effective January 1. Nearly all kinds of fruits are included, both for single variety jelly and for mixed fruits.

These grades are permissible and not mandatory, a point in which they differ from the Food and Drug Administration standards of identity. (A product which is covered both by F. & D. A. standards and Agriculture's grade standards must comply with the former if in interstate commerce, and may also comply with the latter if the manufacturer chooses.) A product which meets the F. & D. A. standard of identity may still be "U. S. Grade D" (or "substandard") according to the Department of Agriculture, if it fails to meet the requirements of the higher grades.

The new grade standards were printed in full in the Federal Register for December 2, beginning on page 8011. This carries out the proposal made in August (see F. I., October 1947, page 132), and represents the first formal issuance of grade standards for fruit jellies.

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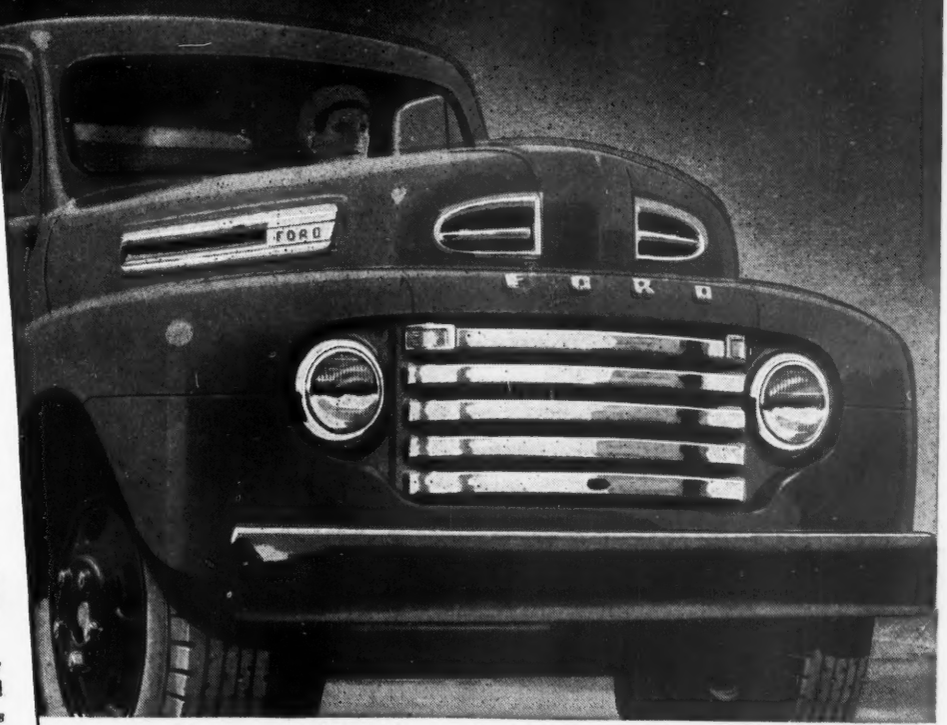

New all through!

NEW ENGINES! Brand new Six, two new V-8's . . . up to 145 h.p.

NEW CABS! Million Dollar Cab with living room comfort!

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NEW BIG JOBS! Biggest Ford Trucks ever . . . up to 21,500 lbs. G.V.W.

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The great new Ford Trucks for '48 are revolutionary not only because they are *new all through* but because they are the amazing result of a time-proved truck engineering principle. This principle is Ford Bonus Built construction.

Bonus Built=Extra Strength! Every single one of the great new Ford Trucks for '48 is Bonus Built . . . designed and built with a margin of *extra strength* in every vital part. But that is only *part* of this vital truck building principle . . .

Bonus Built=Work Reserves! This *extra strength* provides WORK RESERVES that pay off for truck operators in two important, money-saving ways . . .

Bonus Built=Greater Range of Use! These Bonus Built WORK RESERVES give Ford Trucks a *greater range of use* by permitting them to handle loads beyond the normal call of duty! That means that Ford Trucks are *not* limited to doing only one single, one specific job!

Bonus Built=Longer Life! What's more, these same WORK RESERVES allow Ford Trucks to relax on the job . . . to do their jobs easier, with less strain and less wear. Thus, Ford Bonus Built Trucks last *longer* because they are built to work *easier!*

See the great new line of Ford Bonus Built Trucks for '48 now!

***BONUS:** "Something given in addition to what is usual or strictly due."— Webster's Dictionary*

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Double Refined Corn Starch

for the price of ordinary corn starch!

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PURITY "C" a quality starch thickener for cream and fruit fillings; CLEARJEL a scintillating fruit pie stabilizer that is unexcelled for color, clarity and flavor; FLOJEL candy starches in all accurately controlled fluidities; PURITY MOLDING STARCH properly lubricated for gum drops, etc.; PURITY GLAZE an oil-sealer for coating almonds; and PURITY "PWS" a complete salad dressing starch.

Get more for your corn starch dollar. Use MELOJEL to replace ordinary corn starch in all bakery formulas. MELOJEL is double-refined to minimize the cereal flavor . . . to yield a softer, smoother jell with a creamier texture . . . to provide better resistance to watering. MELOJEL is always in stock; always available in quantity.

Try this Donut Tip: MELOJEL, mixed with sugar for powdering Donuts, absorbs the surface grease and permits the sugar to remain appetizingly dry and tasty.

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RAW MATERIALS

Government Begins Agricultural Research

The new year saw activation of the initial program of Research and Marketing Act projects in the Department of Agriculture. From that date on, new projects will begin from time to time and old projects will be reviewed and perhaps continuation authorized, with or without amendment.

Among the specific projects authorized late in 1947, of interest to food men, were the following:

Conversion of vegetable wastes and potatoes to animal feed will be demonstrated on a commercial scale by the Eastern Regional Research Laboratory of the Bureau of Chemistry. Contracting with qualified commercial plants to conduct these demontrations has been planned.

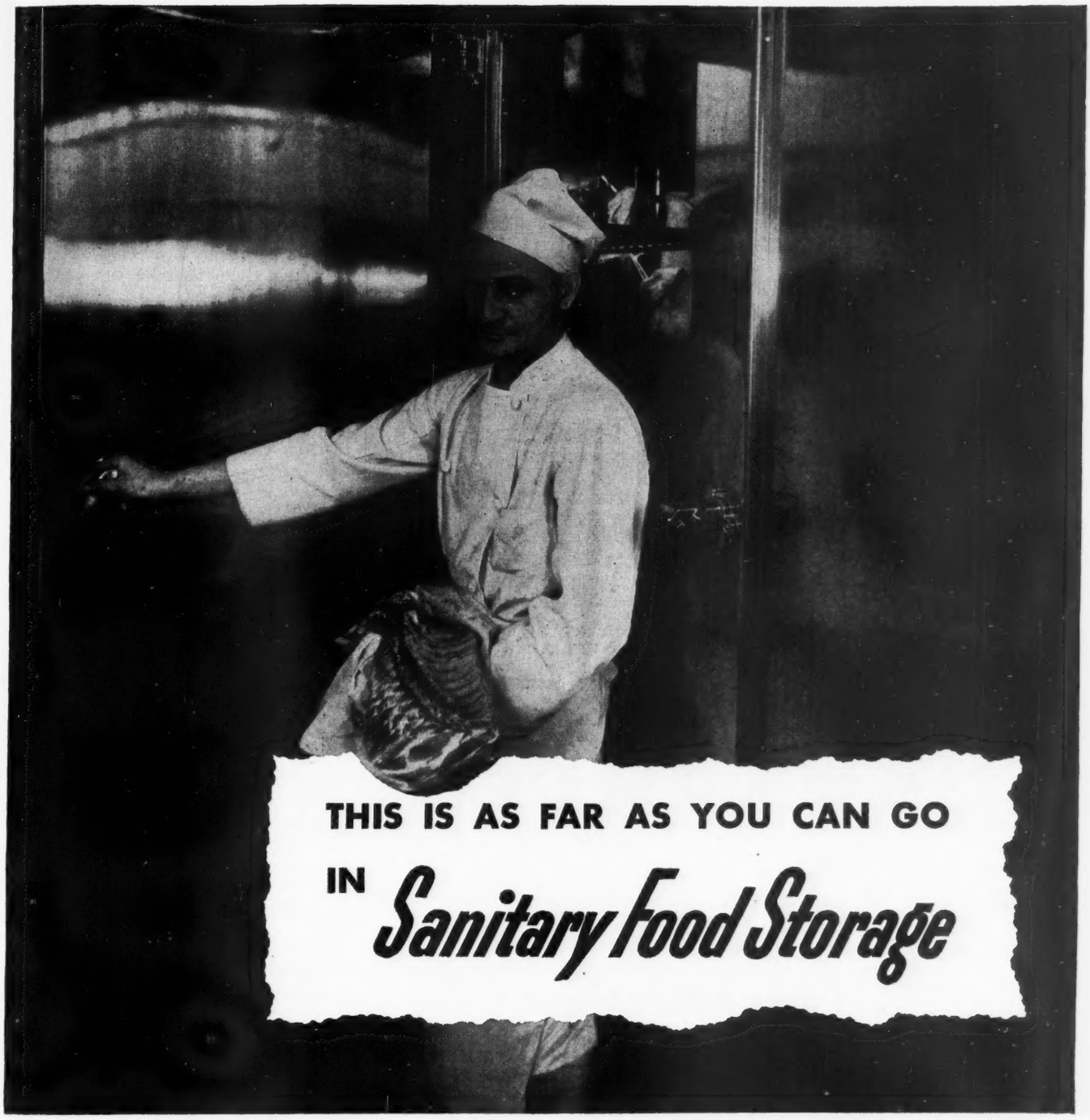
A companion project of the Eastern Lab on drying of potatoes for non-food uses as well as for feed has also been announced. Data on yields, quality, cost, and the general practicability of commercial operations will be obtained through these projects, it is hoped.

Marketing of early potatoes from Southeastern States is the subject of a project to be undertaken cooperatively by the Bureaus of Plant Industry and Agricultural Economics, and the Agricultural Experiment Stations of Alabama, Florida, North Carolina, South

Press Association

FARM GIRL???

This young lady, hailing from Chicago Heights, Ill., was chosen Miss Modern Farm at the national farm show, in Chicago, last December. They did the best they could do to inject some realism into the picture by rounding up a bale of hay for what might be called background, meaning atmosphere.



You just can't provide better protection for any food than to process it, store it, or cook and serve it in stainless steel. That's why you find so much equipment made of Allegheny Metal, America's pioneer stainless steel, in hospital and hotel kitchens, food plants and restaurants everywhere.

The bright, hard surface of Allegheny Metal is extra-easy to clean and keep clean—and its remarkable corrosion resistance combines with great strength and endurance to provide a lifetime of beauty and sanitary service. If product purity and sanitation are important factors in your business—whether or not it has anything to do with food—you owe it to yourself to learn more about Allegheny Metal . . . its ease of fabrication . . . its long-term economy. ● Let our technicians show you just how far you *can* go in getting better service from equipment by making it of Allegheny Metal. It's available *now*—call for an Allegheny Ludlum engineer.

ALLEGHENY LUDLUM STEEL CORPORATION Pittsburgh, Pa.

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Plating solutions
Resins
Shellacs
Soap, liquid
Syrups
Varnishes
Water
Wines

★ Sparkler Horizontal Plate Filters handle any liquid from heavy varnishes to light alcohols.

★ Equally efficient performance on intermittent or continuous operation, under a wide range of temperature, pressure and viscosity conditions.

★ Equally effective whether removing carbons and contact clays or clarifying and polishing with filter aids.

★ Patented Scavenger Plate permits *complete* batch filtration. (It's virtually an auxilliary filter with an independent control valve.)

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Sparkler Filtration Is *Engineered* Filtration—we invite correspondence on your problem. You will receive the advice of filtration scientists with a quarter of a century of experience in a specific field.

SPARKLER MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS

Carolina, and Virginia. Potato shipments will be sampled at various points between the field where they are grown and the wholesale markets which they finally reach.

New and wider uses for citrus fruits will be sought in a research project approved for the Bureau of Chemistry. Commercial scale methods will be developed for the manufacture of citrus powders; volatile flavoring elements of fresh orange juice will be isolated and studied to improve processing methods; chemical studies of citrus juice Pasteurization will be made; enzyme-caused deterioration of citrus products after Pasteurization will be investigated; and a better way of testing citrus fruit for maturity will be developed, it is hoped.

Pear Waste

Also in the Bureau of Chemistry a project has been approved to recover juice from part of an estimated 50,000 tons of waste now said to occur annually at pear processing plants. An improved continuous-type press will be designed and constructed under private contract, according to present plans for this project.

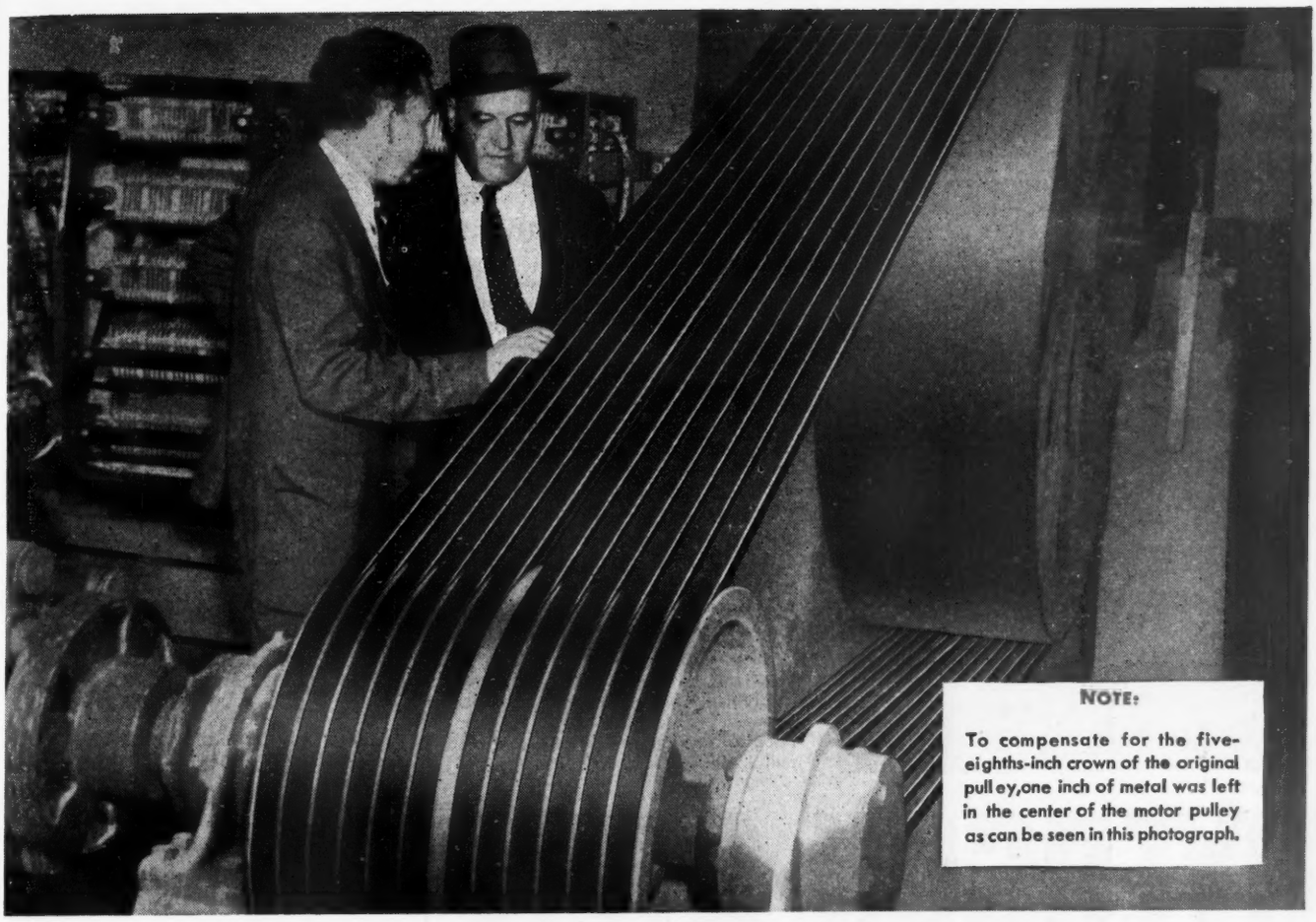
Egg processing facilities and practices will be improved by a project under the direction of Production and Marketing Administration. Methods of grading, processing, breaking, freezing, and drying will be developed which will use personnel and equipment more efficiently and retain egg quality.

Improved processing of livestock and poultry products in cooperative plants will be studied in a project directed by the Farm Credit Administration in cooperation with State agencies.

Development of meat-type hogs will be evaluated by joint studies under the direction of Farm Credit Administration and Bureau of Animal Industry. Cut-out tests and carcass measurements will be made to determine if market premiums are justified. Detroit Packing Company, a farmers' cooperative, will be the site for the first such study.

Citrus Byproduct

FEED yeast grown on juice pressed from ground, limed citrus peel has been announced by the Department of Agriculture, based on cooperative work with Phillips Canning Company of Orlando, Fla. Approximately one pound of dried yeast can be made from the peel normally wasted from a 90 pound box of citrus fruit.

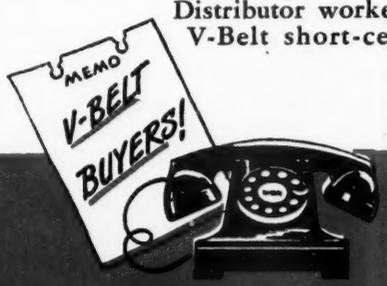

NOTE:
To compensate for the five-eighths-inch crown of the original pulley, one inch of metal was left in the center of the motor pulley as can be seen in this photograph.

POWER PLANT EXPENSE REDUCED OVER $3,000 ANNUALLY

Boilers and machinery in the power plant of a large Central Ohio clay products manufacturer were badly in need of repairs. To replace worn-out equipment called for large capital expenditures and even with new equipment, estimated operating expenses loomed large. The manufacturer turned to his local Dayton V-Belt Distributor for suggestions. He recommended replacing the original prime mover with a 250-HP electric motor. This eliminated the necessity of replacing and operating the worn-out boilers. Further, though only 13 feet of floor space were available, the Distributor worked out a Dayton V-Belt short-center drive that made use of the original, flat, 8-foot-diameter pulley without removing the 5/8-inch crown.

In the first year of operation, the new motor and drive reduced power plant operating costs over $3,000!

Your own local Dayton V-Belt Distributor can give you similar help with your power transmission problems. With his specialized knowledge he can eliminate nearly 95 per cent of all power drive troubles using standard Dayton V-Belts and the power drive accessory equipment he stocks. If necessary, he can quickly secure the aid of a Dayton power transmission specialist. So, for prompt, profitable solutions to your drive problems call your local Dayton V-Belt Distributor.



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Dayton Rubber

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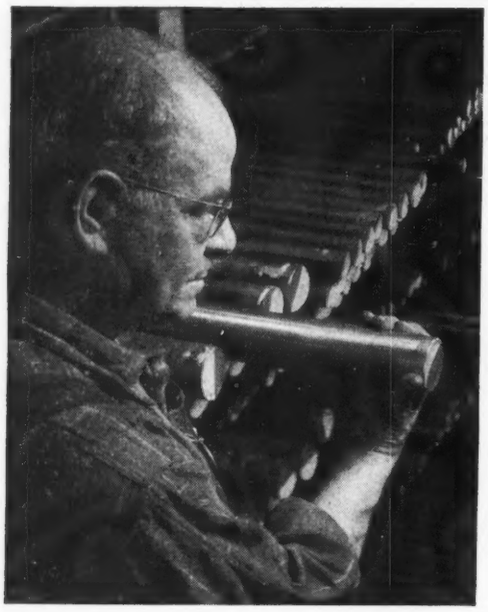

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The exact alloy steel you need is ready for quick shipment from Ryerson because both prewar alloys and war-proved triple alloys are in stock. And under the Ryerson Certified Steel Plan you get a time-saving report with every alloy shipment. Chemical analysis, heat treatment response and recommended working temperatures included in the report are a helpful guide for designers and heat treaters, a reliable record for purchasing men. Call, wire or write the nearest Ryerson plant for diversified alloy stocks plus dependable alloy data.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston, Los Angeles.

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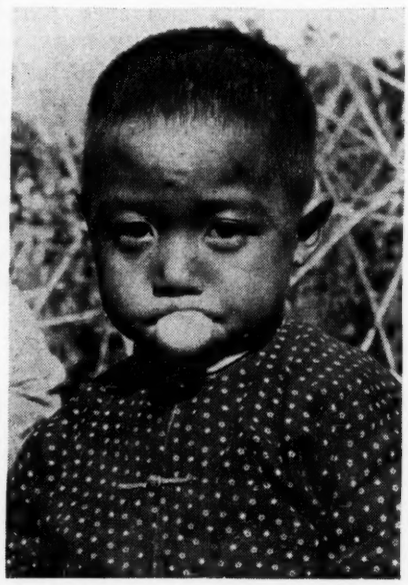
McGRAW-HILL *World News*

Cow Life Extended by Soviet "Cold Method"

Moscow — Soviet veterinarians claim to have broken all world records in extending the life of cows with high milk output to 15 years and over, during which the cows would yield up to 100,000 liters of milk and give birth to 15 calves.

Heading the work is veterinarian Stanislav Shteiman, who organized an experimental farm 20 years ago, where by now more than 30 cows have yielded the hitherto unheard-of results. One of his cows called "the Experimental One" is now 19 years old, has given birth to 15 calves and yielded 98,225 litres of milk. Another cow "Blessing" accounted for 94,800 liters of milk, and a third "Branch," 92,700 liters.

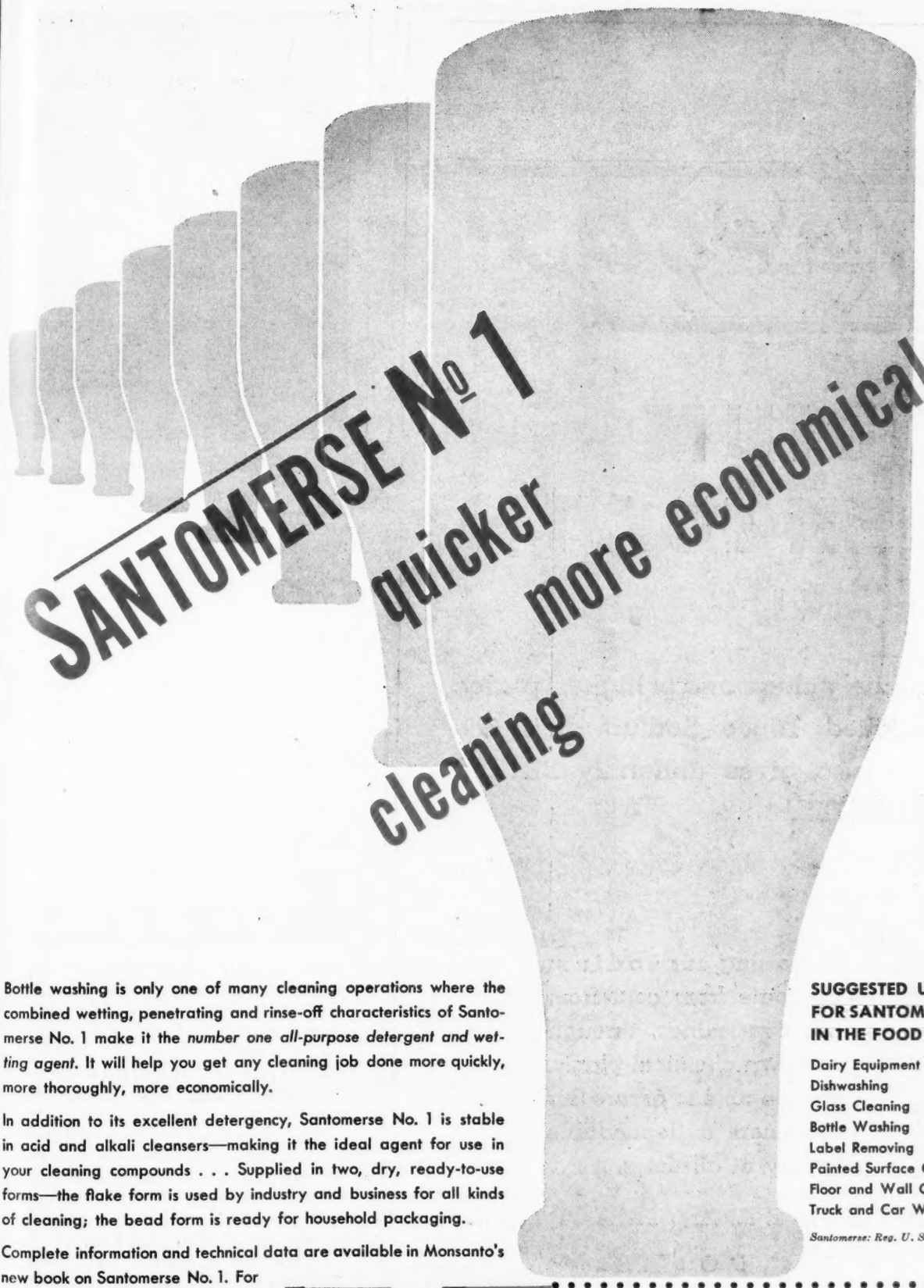
Shteiman's contribution consists mainly in introducing a new method of bringing up the newly-born calves from selected parents—the so-called "cold method." The calves live in unheated barns where the temperature is 5 deg. F. The air is dry. There is plenty of bedding on the floor, and the little animals even wear ear-muffs to keep their



Wide World

PUFF FOR CHINA

China hasn't so many troubles that it can't borrow more. Given time this young man should manage to get somewhere with his bubble gum even though when this was taken he appeared to be strictly a beginner.



Bottle washing is only one of many cleaning operations where the combined wetting, penetrating and rinse-off characteristics of Santomerse No. 1 make it the *number one all-purpose detergent and wetting agent*. It will help you get any cleaning job done more quickly, more thoroughly, more economically.

In addition to its excellent detergency, Santomerse No. 1 is stable in acid and alkali cleansers—making it the ideal agent for use in your cleaning compounds . . . Supplied in two, dry, ready-to-use forms—the flake form is used by industry and business for all kinds of cleaning; the bead form is ready for household packaging.

Complete information and technical data are available in Monsanto's new book on Santomerse No. 1. For your copy, write to MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second St., St. Louis 4, Missouri, or ask any District Sales Office. Return the coupon if you prefer.

DISTRICT SALES OFFICES: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

SUGGESTED USES FOR SANTOMERSE No. 1 IN THE FOOD FIELD

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Dishwashing
Glass Cleaning
Bottle Washing
Label Removing
Painted Surface Cleaning
Floor and Wall Cleaning
Truck and Car Washing

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ALMOST FORGOT

The Friendship train loaded with U. S. food contributions was well on its way before anyone thought of how the cans were to be opened by those on the receiving end. So the can openers were donated by the employees of the Robert H. Clark Co., Beverly Hills, Calif., and flown to New York.

ears from freezing. Despite opposition by a number of scientists who had forecast complete failure, Shteiman succeeded in creating a new breed of healthy cows remarkable for their high yield.

Shteiman's farm has been sending its best cows for breeding purposes to collective and state farms in many parts of the Soviet Union. The "cold method" has been adopted on numerous farms.

India Rationing Lifted Despite Sugar Shortage

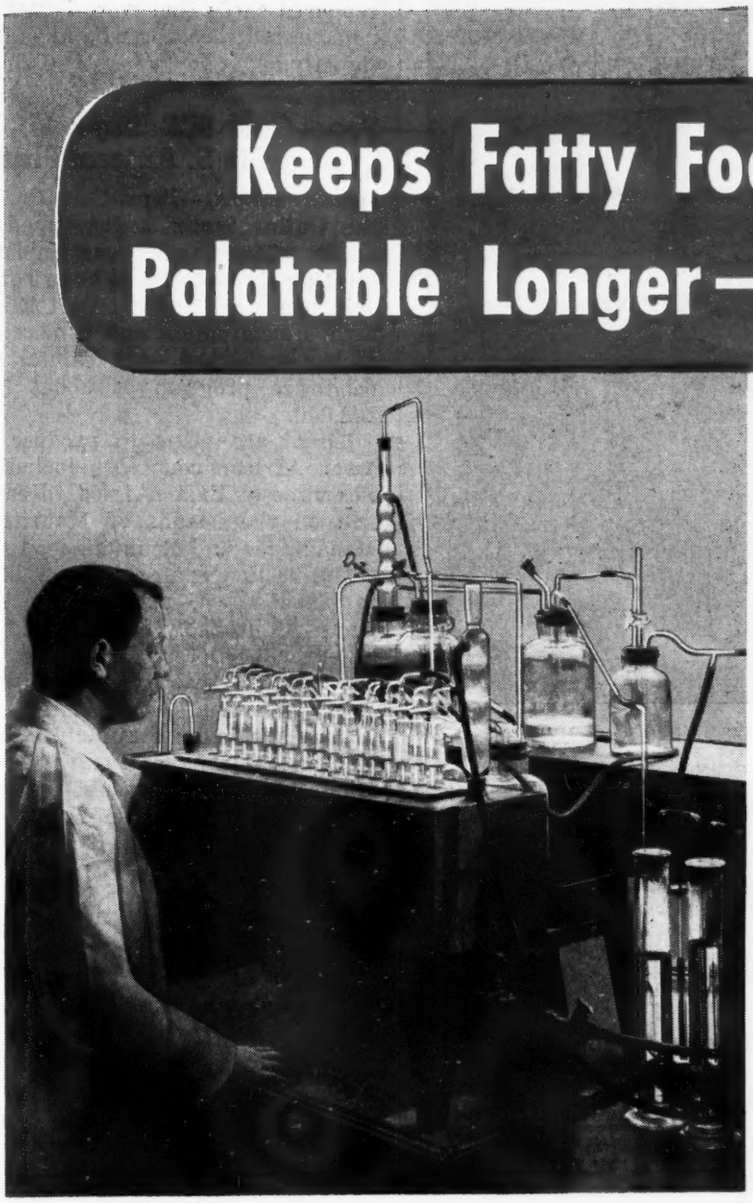
NEW DELHI, INDIA—Despite the fact that Indian sugar production is not sufficient to meet domestic needs and that the past season's output was the lowest since 1941, the Indian government has lifted all price and distribution controls on the commodity.

The move is an outcome of heavy political pressure to remove all commodity controls on the grounds that restoration of a "free economy" will provide incentive to expanded production all along the line.

A measure of the rationing problem, meanwhile, is demonstrated in a recent check made in the city of Bombay. The city's population is estimated to be slightly less than 3,000,000. Against this figure is the admission of rationing authorities that there are probably 700,000 counterfeit or "ghost" ration cards in use over and above the proper amount.

Most of them represent unsur-

Keeps Fatty Food Products Palatable Longer—*Economically!*



NEW, LOW-COST CONCENTRATED G-4 RETARDS RANCIDITY

Non-toxic CONCENTRATED G-4 is a synergistic, fluid, oil-soluble anti-oxidant. *The latest scientific safeguard against rancidity,* it greatly lengthens the shelf-life and edibility of your product.

NO PRE-MIXING

Fluid and oil-soluble, *CONCENTRATED G-4* saves the usual expense and bother of pre-mixing. *Just pour in . . . and stir!* Write for details today.

Bakers! Candy Makers! Meat Packers! Canners!

It will pay you to check on "G-4" stabilization against rancidity in fats and fatty foods.

It's Better, Naturally— When Processed Scientifically!

FOR FLAVOR STABILITY IN ALL SEASONED FOODS

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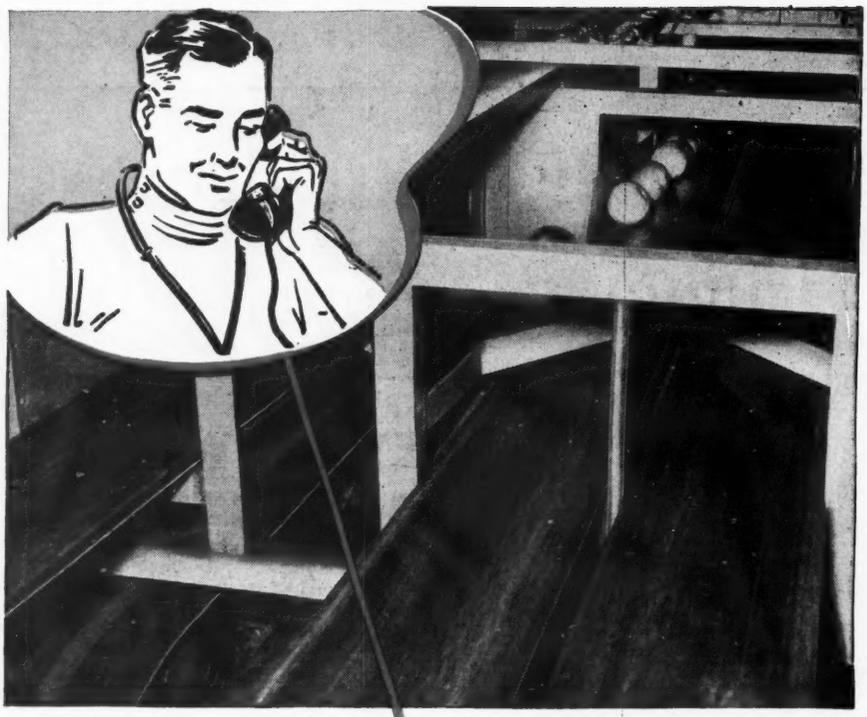

CALL for a SPECIALIST!
YES! CALL for KANRY-TEX

KANRY-TEX was made 'specially for you who process food. Globe research and exhaustive tests by Globe engineers have produced KANRY-TEX to exact specifications of performance and quality based on *your* requirements.

Leading canners and food processors insist on KANRY-TEX—the outstanding conveyor belting for their needs.

That means finer products and lower costs, of course. We'd like to send along, without obligation, some facts to prove these statements. Write today to your mill-supply house—or to us direct.

Some KANRY-TEX Features:

- Does not impart odor or taste.
- Resists moisture, alkali, fats, oils.
- Easily washable with hot water, live steam, or sterilizing agents.
- Long lasting—Economical.

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GLOBE WOVEN BELTS

rendered cards that were issued to persons now dead or who have left the city.

Pepsi-Cola Building Six S. African Plants

JOHANNESBURG—Pepsi-Cola Co. of the United States is interested in South Africa and contemplates erecting six factories in Cape Town, Johannesburg, Durban, Port Elizabeth, Bloemfontein and Kimberley. It has embarked on a capital expenditure program of about $1,200,000.

There are plans to produce in other African countries, including Portuguese East Africa, Kenya, and on the islands of Mauritius, Madagascar and Reunion.

One factory is already being built in Cape Town, and the Durban plans will probably follow next. The others will be erected later.

Pepsi-Cola has arranged with Anglo-Transvaal Consolidated Investment Co. to manufacture bottles to supply the local markets and other African territories, possibly Egypt and the Middle East also. Anglo-Vaal will manufacture the ceramic type of bottle (Applied Collar labels) in a factory in Germiston, near Johannesburg.

SCHEDULE OF EVENTS

February

1- 3—Institute of American Poultry Industries, fact finding conference, Kansas City, Mo.
2- 6—American Society of Heating & Ventilating Engineers, 8th International Exposition, Grand Central Palace, New York.
7- 8—Refrigeration Research Foundation, annual meeting, Haddon Hall, Atlantic City, N. J.
9-11—University of California, food processors conference, Berkeley, Calif.
9-12—National Association of Refrigerated Warehouses and American Warehousemen's Association, Haddon Hall, Atlantic City, N. J.
12-13—Michigan State College, annual canners' and fieldmen's conference, School of Agriculture, East Lansing, Mich.
15-19—American Institute of Chemical Engineers, regional meeting, Roosevelt Hotel, New Orleans, La.

March

15-18—National Association of Frozen Food Packers, 2nd annual convention, Hotel Stevens, Chicago.

April

4- 7—Associated Retail Bakers of America, annual convention, Hotel Sherman, Chicago.
5- 8—National Association of Corrosion Engineers, 4th annual conference and exposition, Jefferson Hotel, St. Louis, Mo.
7-10—National Fisheries Institute, 3rd annual convention, San Francisco.
19—The American Bulk Condensed Milk Association, 3rd annual meeting, Edgewater Beach Hotel, Chicago.
28-May 1—American Society of Brewing Chemists, annual meeting, Hotel Statler, St. Louis, Mo.

Changes in Food Supplies

(Indicators)

Production

Canned sweet corn packed in 1947 reached the equivalent total of 26,089,000 cases, basis 24/2's, according to the National Canners Association. This is about 16 percent under the 1946 output of 30,051,000 cases, but is about 40 percent above the prewar average.

Ice cream production dropped to 31,025,000 gal. in November, 35 percent under October and 29 percent under November, 1946. Last year the seasonal decline was 22 percent and the 1941-45 average October-November decrease was only 18 percent.

Creamery butter production in November, estimated at 69,185,000 lb., declined 25 percent from October, a sharper than usual decrease. Last year's October-November decline was 18 percent, while the recent five-year average is only 16 percent.

American cheese production, in November, is estimated at 44,520,000 lb. This was 31 percent under October and 14 percent smaller than the November, 1946, output. The seasonal decline last year was only 17 percent, while the five-year average drop was 22 percent.

Canned evaporated milk production in October totaled 200,500,000 lb., an increase of 3 percent over October, 1946, but 11 percent below the 1941-45 average. Production for the first ten months of 1947 totaled 2,853,900,000 lb., an increase of 6 percent over the same months last year.

Canned condensed milk output, in October, totaled 19,500,000 lb., an increase of 151 percent over the same month last year, and 109 percent over the recent five-year October average. This is the largest October production since 1922.

Lard production in November came to 178,162,000 lb., up from the 120,433,000 lb. produced in October.

Materials

All-crop production in 1947, was only 2 points below the 1942-46 average, but was 6 points under 1946. Only in 1942, 1944 and 1946 was the all-crop output higher than in 1947.

The pig crop in 1947 totaled 84,138,000 head, an increase of 1 percent over the year before. A decrease of 11 percent from last spring is indicated in the sows to farrow in the coming spring.

Chicks produced by commercial hatcheries came to 34,104,000 in November, 24 percent below output of a year ago, but about equal to the 1941-45 November average. Production of chicks for the first 11 months, estimated at 1,230,917,000 was about the same as during the corresponding period in 1946. December production, however, was expected to be about 17 percent below December, 1946.

Stocks and Storage

Canned pea supplies for the 1947-48 season were at a record high in December, according to the National Canners Association. Reaching a total of 47,700,000 cases, basis 24/2½'s, the supply compares with 45,900,000 cases in the 1946-47 season, and 42,100,000 cases in 1945-46.

Frozen fish and shellfish held in storage, December 1, totaled 141,671,701 lb., a drop from the 158,486,028 lb. held on Dec. 1, 1946. The December holdings were only slightly above the 140,069,000 lb. held on November 1.

Public cooler occupancy on December 1 reached 78 percent filled, while public freezer space on the same date was reported as 84 percent occupied. Occupancy in apple storage December 1, was 78 percent.

Indexes

The commodity price index on food, compiled by the New York Journal of Commerce, was 213.4 for the week ending January 10, compared with 214.1 for the previous week, 207.2 for December, and 179.8 a year ago.

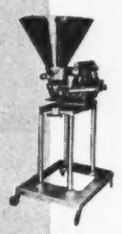
Business Week's index of business activity was at 191.7 for the week ending January 3, compared with 190.7 the preceding week, 192.7 the month before, and 189.0 a year ago.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded Jan. (thousands)	Total Awarded 1947 (thousands)
Bakery	$ 70	$ 75	$ 17,276
Beverages	2,000	1,809	38,821
Canning and Preserving	....	....	734
Cold Storage	....	....	4,637
Confectionery	....	....	1,364
Grain Mill Products	190	253	30,322
Ice, Manufactured	....	....	566
Meats and Meat Products	68	....	6,718
Milk Products	325	....	8,809
Miscellaneous	70	90	18,542
	$2,723	$2,227	$127,789*

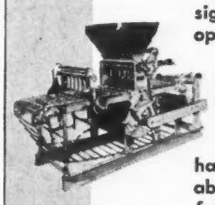
*Complete 1947 total.

GEYER
SINCE 1914
"WE'VE PACKED THEM IN FOR YEARS"

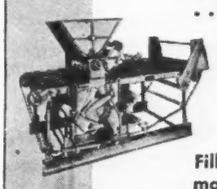


It is a matter of record that the "GEYER" Filling Machines have "packed them in" by solving packaging problems for the food industry over a period of thirty-three years.

Custom built, compact Filling Machines that handle semi-liquids to semi-solids and designed from a cost and operating standpoint to be adaptable for large or small production quotas — there is your assurance of a Filler that has earned an enviable record for performance in packaging.



Fillers are straight line with multiple cylinders . . designed for CLEAN CUT OFF FILLING for products that seek their own level . . BOTTOM UP FILLING for semi-solids . . No drip . . Clean Filling . . Entirely automatic . . Readily adjustable to any size or shape container . . Maximum production output.



The Most Prominent Food Packers Use Geyer Filling Machines

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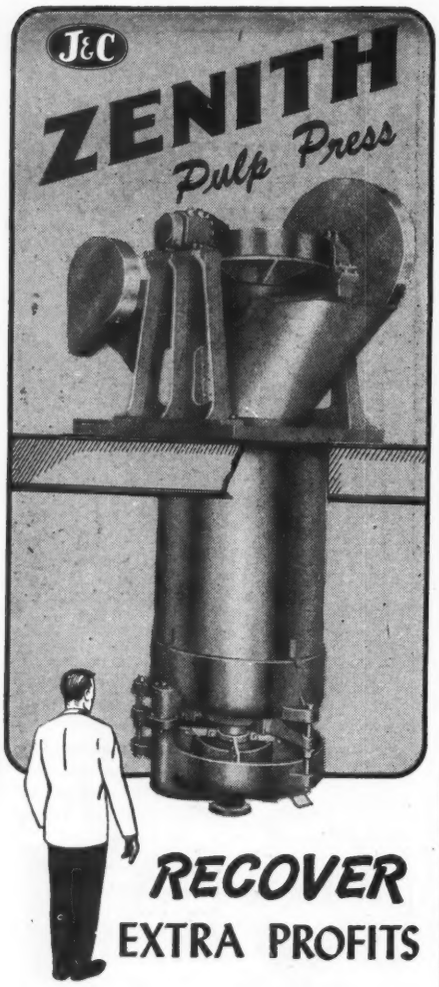
SYRUP	MAYONNAISE
JELLIES	PEANUT BUTTER
CHEESE	APPLE BUTTER
GLUE	VANISHING CREAM
PASTE	MUSTARD AND
GREASE	SIMILAR PRODUCTS

THE FILLER MACHINE CO. INC
1248 E. MONTGOMERY AVE., PHILA., PA.

J&C
ZENITH
Pulp Press



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PRESSING EFFICIENCY

New uses for the Zenith Pulp Press are being discovered every day. Among the many installations for DEWATERING are: BEET PULP • PINEAPPLE • TOMATO POMACE • CORN GERM and FIBRE • VEGETABLES • BREWER'S GRAIN CHERRIES • CITRUS FRUITS • FISH • PAPER PULP RECLAIMED RUBBER • TANKAGE • etc.

100% continuous... from storage bin to pressed cake, the Zenith Pulp Press dewaters up to 26 tons of wet pulp per hour.

The material is fed mechanically to a tapered screw-type spindle that compresses and forces it through the press, discharging liquid through the central orifice and pressed cake to conveyor for disposal.

Constantly rolling pulp assures maximum dewatering. Heater resistors permit steam injection.

A Pilot Press is available for trial in your plant.

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What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

CHEAPER GRAIN—About a billion dollars worth of grain is lost annually by insects, rats, and molds, according to official estimates. Most of this loss occurs on the farm in storage. Suppose that much more grain in good condition reached the markets for sale and use. Obviously the price would be lower and the world scarcity less serious. Established methods for pest control on the farm are known, and an abundance of DDT is available to carry them out. Perhaps the food industries will have to join in the campaign to help farmers save grain losses. No one would more quickly and more directly benefit.

TIN SUBSTITUTE—Tin used to cost about 50 cents a pound. The price has just been jumped to 94 cents by Reconstruction Finance Corporation. This ups the U. S. quotation by 14 cents to match the price from Britain and from Malaya. It also greatly increases the interest of food men in getting a substitute for tin as a container coating. Plastic coatings go down in cost as tin rises. It's reasonable to expect that they will further replace tin.

NO-RISK BUSINESS—The agricultural industries, especially farmers, are going to be protected against many business hazards by continuance of federal relief and aid measures. With present high prices for farm products, this seems a needless effort of Washington. But no realist expects Congress to repeal farm-aid measures in a Congressional election year.

RECONTAMINATION — Danger of recontamination of food utensils is suggested if the insecticide control officials of the Department of Agriculture insist on one newly proposed precaution. This would require the rinsing of equipment and dishes after they have been sterilized by quaternary disinfectants. The commendable purpose is to prevent poisoning of those who eat food subsequently contaminated by toxic disinfectant residue. Two important questions are involved. Which quaternary disinfectants are really toxic, if any? And is there not a better way to prevent residue contamination of food than rinsing, which may not always be done with sterile water? Those interested in quick effective sterilization of plant equipment and utensils will need to study these questions carefully lest they lose the benefit of some of the modern control chemicals. Among other things, it will be important to find out which chemicals are toxic, and under what circumstances may significant residues get into food from properly drained utensils which have been sterilized with these chemicals.

MORE FREIGHT CARS—Worldwide bottleneck, as well as major United States worry, is the shortage of freight cars. Radical remedy suggested by responsible metallurgical men is that the bodies of freight cars be made of a low-alloy steel instead of ordinary carbon steel. Thus four cars can be made with the tonnage of steel which would be required for three ordinary car bodies. Since steel plate for these car bodies is the limiting factor in the number which can be made, the proposal seems to make sense. Main objection is inertia of railways, car builders, and official Washington. Perhaps food companies can yell loud enough for more cars to get at least partial adoption of this proposal.

CHANGES NECESSARY—Control of foot-and-mouth disease in Mexico has developed complications. Reinfection is developing behind the lines of control because natives evade the inspection and the Mexican army is not able to enforce rules of quarantine as rigidly as is needed. For political reasons the authorities have also had to reduce the slaughter and attempt vaccination as a substitute. Official Washington believes that the result will be

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New Title or Position .....

a major slowdown with greatly increased danger of infections in Texas.

The Texas cattle industry and the meat packers want to do something about it, as they should. Apparently they will have to go into Mexico to provide cattle processing on a big scale so that the killing program can be accompanied by a canning of useful meat and the processing of the rest of the animal to feed, fertilizer, and soap fat. Washington is dubious about anything less than such large-scale industrial cooperation to eliminate the infection in Mexico. American enterprise has so much at stake that perhaps this abnormal venture may be justified.

SALARY CEILINGS—Many employers, including Uncle Sam, are having difficulty holding salaried employees of the younger group. The reason is easy to find. Bright young men and women are not interested in a present job that has an unreasonably low ceiling for the indefinite future. If the boss and the boss' boss get mediocre compensation, the young man says, logically, "Why not work for someone else with whom I have a chance to earn good pay when I am old enough to be the boss?" Food plants probably notice this too, especially with young technical and other college-trained staffs.

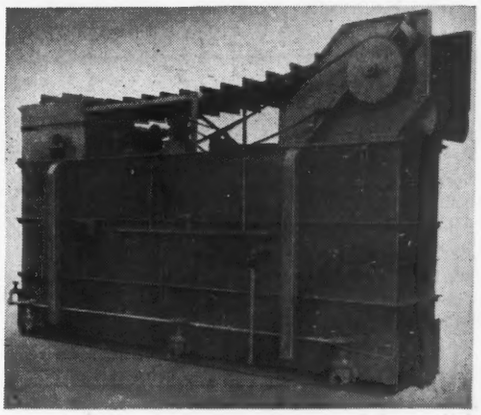
CANNING WAGES—Labor Department rulings place the handling, labeling, and casing of canned fruit and vegetables on the same wage basis as employment in the direct processing operations. Thus the holding and warehousing operations, if reasonably near the cannery, are exempt from the overtime rules just as is processing employment of the same establishments. This is one of the evidences of sane application of wage-hour rules at the Department of Labor.

ALFALFA PRODUCTS—High-grade powdered concentrate of valuable proteins, vitamins, and pigments from alfalfa can be made by processes devised in the Western Regional Research Laboratory. Successful application will require hammermill disintegration of fresh alfalfa, juice extraction, spray drying, and other modern chemical engineering techniques. If one is less ambitious, he may modify the process to make a high-value chicken feed component with less intricate unit operations. Food companies interested in new products may do something to commercialize these suggested new processes.

BACK 35 YEARS—The tariff rates now applicable are roughly those established by the Underwood tariff in 1913. Thus the program of trade agreement negotiations has repealed all subsequent Congressional laws and gone back to a basis equal to "tariff for revenue only." Industrial reaction critical of this has been negligible.

BEETS • CARROTS • POTATOES

BLANCHED
• ECONOMICALLY
• EFFICIENTLY
• QUICKLY
IN AN



ALLAN *Continuous* SCALDER

ALLAN Continuous Scalders blanch more root vegetables at far lower costs. Here are a few reasons why—
• High-capacity skin loosening by combination steam-water scald.
Beets—6 tons-per-hour (without use of caustic agents)
White Potatoes—12 tons-per-hour
Sweet Potatoes—12 tone-per-hour
Carrots—12 tons-per-hour.
Using small percentages of caustic agents much higher capacity depends on condition of vegetables and grades of blanch desired.
• Low Operating Costs
One man can easily operate two ALLAN Continuous Scalders. ALLAN Continuous Scalders use considerably less steam.
• High Quality Product
Close Enzyme Control.
Uniform scald and controlled penetration of heat into vegetables.
Allan Iron & Welding Works, Inc., 137 Murray Street, Rochester 6, New York

Ask for Bulletin R-3

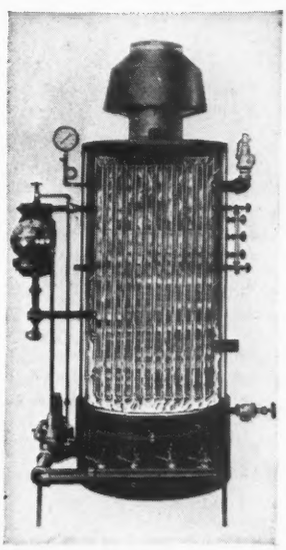
ALLAN CANNING MACHINERY

THE ANSWER TO YOUR STEAM PROBLEM

A KANE BOILER PACKAGE

Yes, it's a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

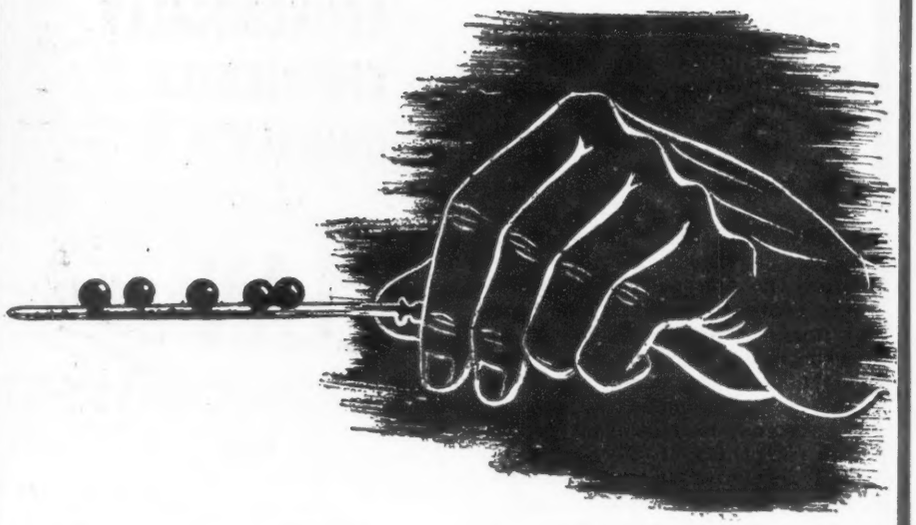
Engineered Steam at its best with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.



The KANE Boiler is built to A.S.M.E. specifications, in sizes to 30 H.P.

MEARS-KANE-OFELDT INC.
1903-1915 EAST HAGERT STREET, PHILADELPHIA 25, PA.
FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE.

it takes balance



Whether it's peas on a knife . . . or the emulsifier you choose for your needs . . . it takes balance!

Your emulsifier must be scientifically balanced to do precisely what you require. This is the basis upon which The Emulsol Corporation built its research in developing such outstanding products as:

- Emcol MS: High monoester glyceryl monostearate —non self-emulsifying—edible.
- Emcol RH: Self-emulsifying glyceryl monostearate —edible. Designed for Emulsifying, Plasticizing, Texturizing, Freshening, Bodying, Stabilizing.

And most keenly balanced of all . . . The Emulsol Corporation's recognized "know-how" technical services. Send us your problem on your letterhead and, at no obligation, we will give you the most effective answer.

THE EMULSOL CORPORATION

59 East Madison Street **Chicago 3, Illinois**

MEN • JOBS • COMPANIES

INDUSTRY

The Birdseye-Snider Division of General Foods Corp., at Albion, N. Y., suffered a $25,000 loss by fire on December 27. The two-story structure will be replaced with a new building.

The Coca Cola Bottling Co., Cleveland, has completed plans for the construction of a $2,000,000 bottling plant to be located on a nine acre site in that city.

Dorset Foods, Ltd., Long Island City, N. Y., has announced the resignation of J. J. Akston as president and director of the company. He is succeeded by Emanuel Ebin.

B. A. Eckhart Milling Co., Chicago, has begun a $750,000 plant modernization to be completed this year.

Hires Bottling Co. of Southern Connecticut, has broken ground at Orange, Conn., for a new plant. The building will have an area of 25,000 sq. ft. and will be constructed of cinder block, glass block and steel. George P. Darrow III is owner and manager of the new unit.

Kistler's Radar Sandwiches of Texas, a newly formed corporation, operating on a franchise from the parent organization in Akron, Ohio, has announced plans for a food factory in the east end of Houston to cost approximately $125,000.

National Confectioners' Association has appointed George H. Fox as field representative, according to an announcement by Philip P. Gott, association president.

Joseph Schlitz Brewing Co., Milwaukee, has purchased the remaining portion of the north section of the Milwaukee Ordnance Plant for $949,000. The five-story concrete brick factory, a hospital and personnel building, fire house, power plant, water softener plant and salvage building on 75 acres of land will be used by Schlitz for business expansion. Approximately 2,000 persons will be employed.

Sunshine Biscuits, Inc., Long Island City, N. Y., has appointed W. A. Sullivan to the newly-created post of controller. Mr. Sullivan has been with Sunshine for almost 20 years.

Swift & Co., Chicago, has taken over operation of the Supreme Quality Products, Inc., plant at Whittier, Calif., for ice cream manufacture. J. E. Witt, formerly manager of the company's dairy and poultry plants in Great Falls, Mont., Portland, Ore., and Hanford, Calif., has been named manager of the Whittier operation. The present plant capacity is 400,000 gal. annually. This will be increased as soon as materials are available.

Donald K. Tressler and Associates, Westport, Conn., has appointed L. Ray Ferguson to its staff. Mr. Ferguson has been assistant to the director of research and development activities at General Foods Corp.

DON F. COPELL

As chief engineer of Wagner Baking Corp., Newark, N. J., and editor of Modern Management, Don F. Copell is awarded the Gilbreth Medal for 1947 for distinguished contribution to industrial engineering.

R. B. THOMAS

Vice-president of American Home Foods, Inc., R. B. Thomas has been appointed general manager of Clapp's Baby Food Division of the company, according to an announcement by Victor T. Norton, president.

C. W. BEILFUSS

President of Derby Foods, Inc., Chicago, since 1931, C. W. Beilfuss has announced his retirement as head of the firm. Prior to joining the Derby organization, he was associated with Libby, McNeill & Libby.

PAUL LOGUE

Director of development of the Phosphate Division, Monsanto Chemical Co., St. Louis, Paul Logue is the new chairman of the Division of Agricultural and Food Chemistry of the American Chemical Society.

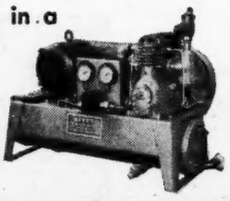
Universal Match Corp. has sold its interest in Jacobs Candy Co., Inc., New Orleans, to local interests, who will continue to make a line of special New Orleans candies and pralines and a general line of candies for distribution throughout the southern part of the United States.

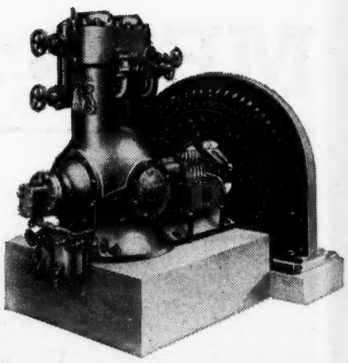
W. T. Wagner's Sons Co., Cincinnati, has purchased the Queen City Bottling Co. of that city, according to a recent announcement by Edward Wagner, president.

(*Continued on page* 166)

THERE IS A BAKER UNIT AVAILABLE FOR EVERY TYPE OF JOB

Baker offers a complete line of precision-built Freon and Ammonia equipment. Units in a wide range of capacities for both low and high temperature work.





OVER 40 YEARS OF ENGINEERING EXPERIENCE

Since 1905 Baker has pioneered in many fields of refrigeration and air conditioning. Today its wealth of knowledge is available to find the right answer to your problem.

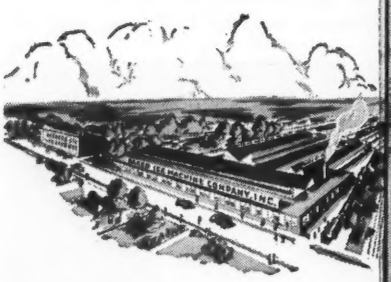
BAKER

a Great name in

AIR CONDITIONING AND REFRIGERATION

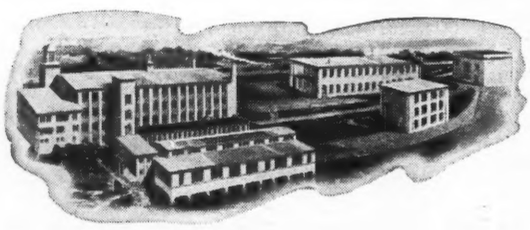
SINCE 1905

Photo by Keystone View Co. of N. Y., Inc.



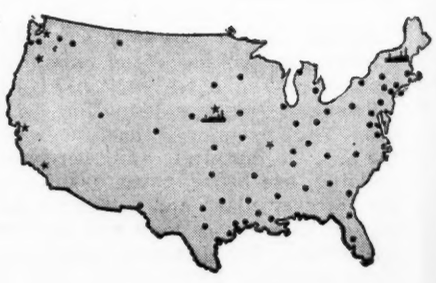
ENLARGED PLANT FACILITIES

at South Windham, Me. and Omaha, Neb., are turning out more Baker quality equipment than ever before in the company's history.

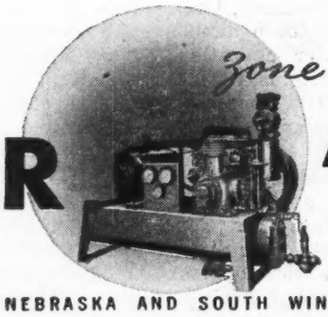


BAKER SERVICE IS NEAR YOU!

Company branches and distributors, staffed by experts are located in principal cities from coast to coast. For the name and address of the office nearest you, write: Baker Ice Machine Co., Inc., South Windham, Maine. B-1

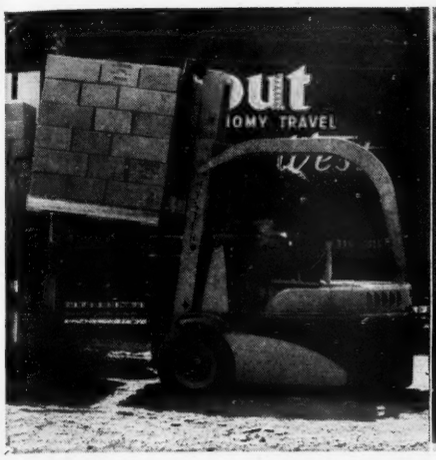


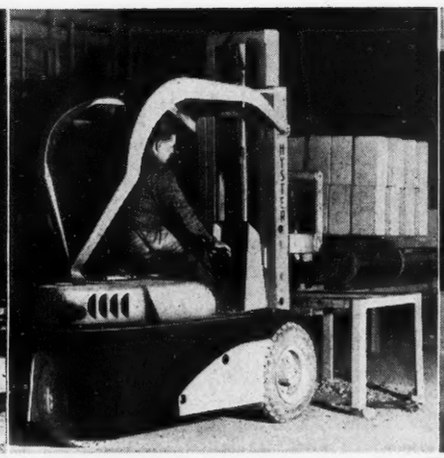
Zone balanced • Engineered

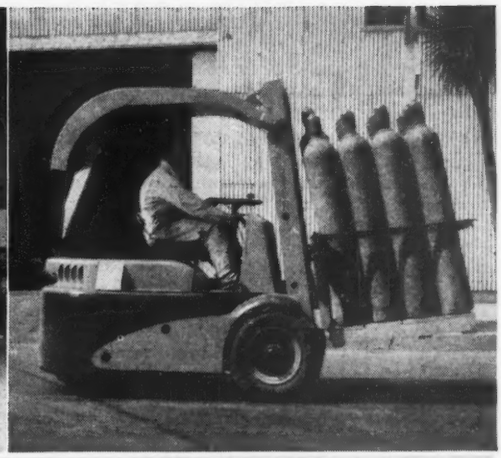


BAKER AIR CONDITIONING AND REFRIGERATION

FACTORIES AT OMAHA, NEBRASKA AND SOUTH WINDHAM, MAINE • • • HEADQUARTERS, SOUTH WINDHAM, MAINE







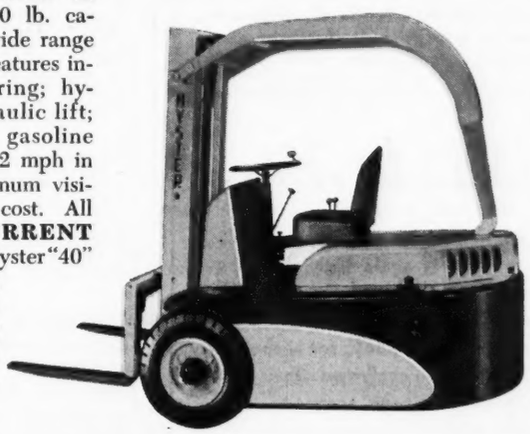
7 OUT OF 10 MATERIALS HANDLING PROBLEMS ARE SOLVED BY THE...

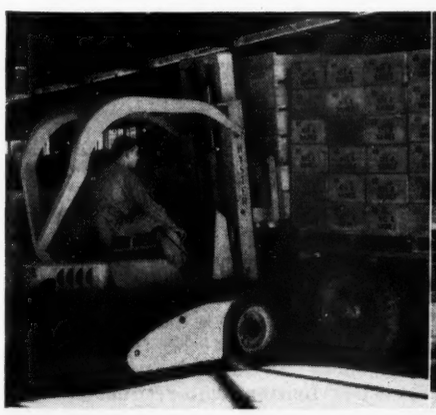
HYSTER 40

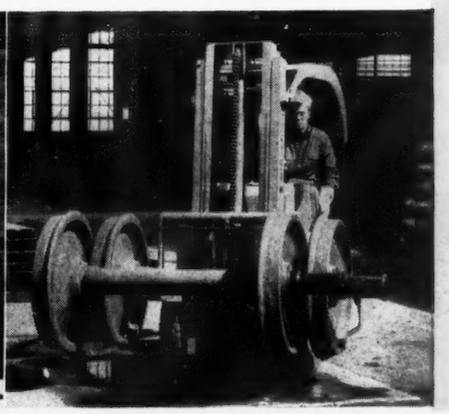
Here's the lift truck that has been engineered and built to do *more* jobs in *more* industries *THAN ANY OTHER LIFT TRUCK ON THE MARKET.* This 2 ton capacity unit on pneumatic tires works indoors or outdoors, on rough or smooth surfaces; hoists, transports and tiers heavy or bulky loads easily, quickly, economically.

PNEUMATIC TIRES! CURRENT DELIVERY!

Pneumatic tires are easier on loads and floors. 4000 lb. capacity is ideal for a wide range of industries. Added features include trunnion steering; hydraulic brakes; hydraulic lift; powerful air cooled gasoline engine; speed up to 12 mph in either direction; maximum visibility; low operating cost. All of this, **PLUS CURRENT DELIVERY**, marks Hyster "40" as a money, time and labor saving machine that should be working for you right now. See your Hyster distributor. Write for literature.







GO TO YOUR HYSTER DISTRIBUTOR FOR CURRENT DELIVERY

ALASKA—Northern Commercial Co.
BROOKLYN, N. Y.—A. S. Rampell
BUFFALO, N. Y.—Rapids Handling Equipment Co. of Buffalo, Inc.
CALGARY, ALTA.
A. R. Williams Machy. Western, Ltd.
CHICAGO, ILL.—Hyster Company
CINCINNATI, O.—Oral T. Carter & Associates
CLEVELAND, O.—Morrison Company
DALLAS, TEX.—C. H. Collier Company
DENVER, COLO.—Paul Fitzgerald
DETROIT, MICH.—Bentley & Hyde
GRAND RAPIDS, MICH.—Bentley & Hyde
HALIFAX, NOVA SCOTIA
A. R. Williams Machy. Co., Ltd.
HONOLULU, T. H.—Electric Steel Foundry Co.
HOUSTON, TEXAS—C. H. Collier Company
INDIANAPOLIS, IND.
Central Rubber & Supply Co.
JACKSONVILLE, FLA.
L. S. Teague Equipment Co.
KANSAS CITY, MO.
Industrial Power Equipment Co.
LOS ANGELES, CALIF.—Hyster Company
LOUISVILLE, KY.—Embry Brothers, Inc.
MEMPHIS, TENN.
Hyster Co. of Louisiana, Inc.
MILWAUKEE, WIS.—Hyster Company
MINNEAPOLIS, MINN.—W. S. Nott Company
MOBILE, ALA.—S & T Equipment Co., Inc.
MONTREAL, P. Q.
A. R. Williams Machy. Co., Ltd.
NEW ORLEANS, LA.
Hyster Company of Louisiana, Inc.
NEW ROCHELLE, N. Y.
Eastern Industrial Sales Co.
OTTAWA, ONT.
A. R. Williams Machy. Co., Ltd.
PHILADELPHIA, PA.—Rapids Handling Equipment Co. of Phila., Inc.
PHOENIX, ARIZ.—Equipment Sales Company
PITTSBURGH, PA.—Equipco Sales Company
PORTLAND, ORE.—Hyster Sales Company
ST. JOHNS, N. F.—City Service Company, Ltd.
ST. LOUIS, MO.—Wharton L. Peters
SALT LAKE CITY, UTAH
Arnold Machinery Company
SAN FRANCISCO, CALIF.—Hyster Company
SEATTLE, WASH.—Hyster Company
TORONTO, ONT.
A. R. Williams Machy. Co., Ltd.
VANCOUVER, B.C.
A. R. Williams Machy. Western, Ltd.
VICTORIA, B.C.
A. R. Williams Machy. Western, Ltd.
WINNIPEG, MAN.
A. R. Williams Machy. Western, Ltd.
YUKON TERRITORY
Northern Commercial Company

In addition to above, Hyster Export Dealers are located in 30 foreign countries.

HYSTER COMPANY

THREE FACTORIES
2902-35 N.E. CLACKAMAS, PORTLAND 8, ORE.
1802-35 NORTH ADAMS, PEORIA 1, ILLINOIS
1010-35 MEYERS STREET, DANVILLE, ILLINOIS

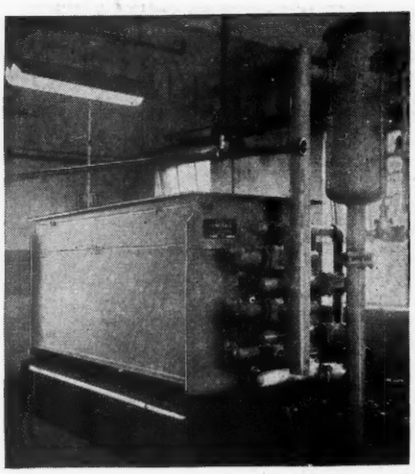
NIAGARA LIQUID COOLER
Gives High Capacity in Small Space

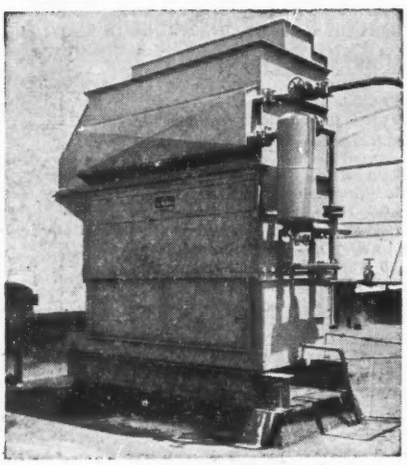
Cold water, chilled to 33° F., or cold liquids, or non-freezing solutions below 32° F. are produced economically by the new Niagara Liquid Cooler.

For large capacity equipment it is most compact. For example, one model furnishes 92 G. P. M. of water cooled from 45° F. to 35° F., with 28° F. refrigerant, in less than 30 sq. ft. of floor space. Other models . . . 24 to 465 G. P. M.

Extra advantages positive temperature control; assurance of holding temperature accurately in spite of variation in cooling load; rapid chilling of liquid; savings in power and refrigeration.

Write for Bulletin No. 100-FI.





NIAGARA Aeropass CONDENSER

. . . increases plant capacity for refrigeration users, saves power, saves condenser water. "Duo-Pass" (patented) reduces condensing temperature, prevents scaling and clogging of condenser tubes. "Oilout" (patented) removes oil and dirt from refrigerant, assuring full capacity.

Write for Bulletins 91-FI and 103-FI

NIAGARA BLOWER COMPANY
"30 Years of Service in Industrial Air Engineering"
405 Lexington Ave., New York 17, N. Y.
Field Engineering Offices in Principal Cities

HAROLD OLDROYD

Blue Moon Foods, Inc., Thorp, Wis., has announced the appointment of Harold Oldroyd as general manager of the company with headquarters at the general offices at Thorp.

PERSONNEL

William T. Brady, vice-president of Corn Products Refining Co., New York, has been elected a director of the company. He has been an executive of the manufacturing departments and has served as general manager of the company's plants at Edgewater, N. J., Kansas City, Mo., and Argo, Ill. Most recently, he has been serving as assistant to the president.

Smith H. Cady, Jr., has resigned as director of the Council on Candy of the National Confectioners' Association, according to an announcement by Philip P. Gott, NCA president. During the past four years, under Mr. Cady's guidance, the industry has raised more than $1,750,000 to impress upon the nation the value of candy as an energy food. Most of the sum has been spent in magazine advertising.

George S. Carrie, formerly with the Carrie Bakery, Detroit, has become a member of the American Institute School of Baking staff to assist the instructors in the bread and sweet goods bake shops.

Y. F. Combs, who was head chemist for J. R. Short Milling Co., Chicago, has been named manager of the Mt. Vernon Milling Co., Mt. Vernon, Ind.

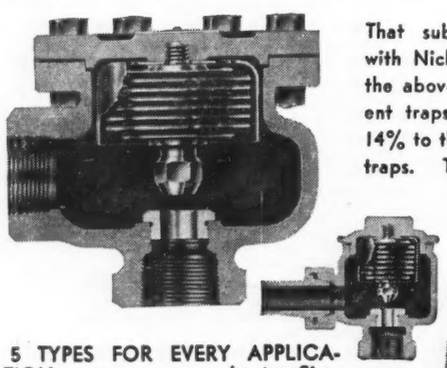
Roy F. Eachon, formerly with Jacobsen Bakery, Spokane, Wash., and a recent graduate of the American Institute School of Baking, has joined the school's staff in Chicago, where he will work in the experimental bake shop.

Frank M. Frost has been appointed general manager of the H. J. Heinz Co. offices in Buffalo, succeeding Ernest L. Britten, who retired.

NICHOLSON TRAPS

TOPS AGAIN IN TEST!
Comparative tests for steam waste, made by a large manufacturer, show Nicholson traps low with 1.04%.

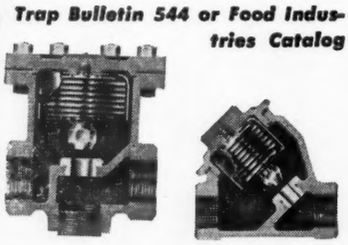
Cut Steam Loss to 1%

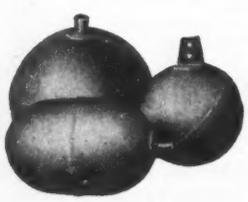


That substantial fuel savings are possible with Nicholson traps is again highlighted by the above mentioned test. For the 14 different traps on test, steam losses ranged from 14% to the record low of 1.04% for Nicholson traps. The test also confirmed their unequalled drainage capacity and proof against freezing.

Trap Bulletin 544 or Food Industries Catalog

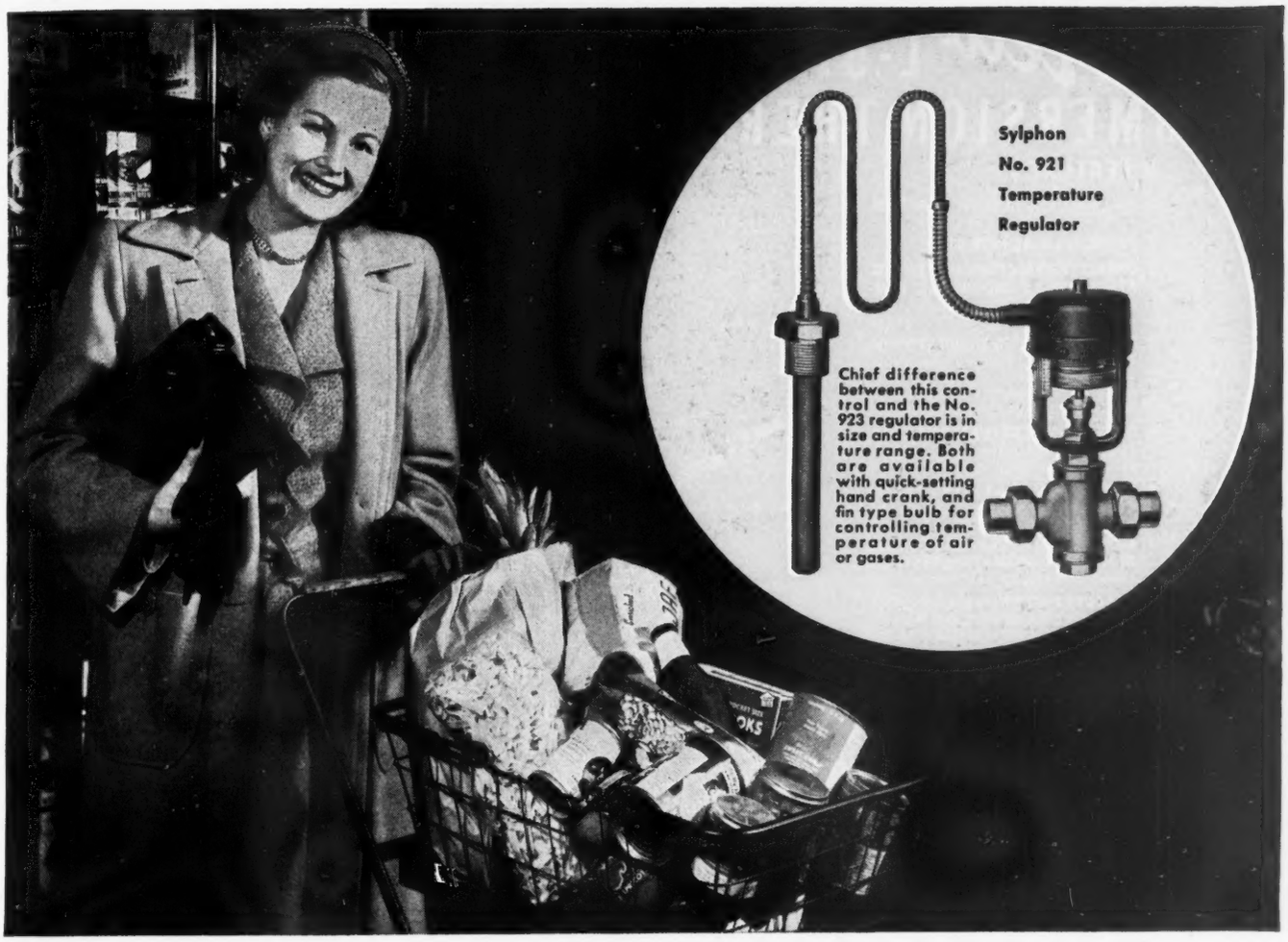
5 TYPES FOR EVERY APPLICATION—process, power heat. Size ¼" to 2"; pressures to 225 lbs. Bulletin 544.





HIGH-PRESSURE FLOATS - In all sizes and shapes. Nicholson is one of the largest makers of welded floats for operating mechanisms and as H.P. storage vessels. Bulletin 746.

W. H. NICHOLSON CO.
193 Oregon St., Wilkes-Barre, Pa.
Valves • Traps • Steam Specialties


Sylphon
No. 921
Temperature
Regulator
Chief difference between this control and the No. 923 regulator is in size and temperature range. Both are available with quick-setting hand crank, and fin type bulb for controlling temperature of air or gases.

When *she* says it's good . . . you can thank accurate temperature controls

No matter what you manufacture . . . food, chemicals, textiles or other processed products . . . the final judge of quality is the consumer.

When that judgment is favorable, you've not only completed one sale . . . but you've also paved the way for another.

Most manufacturers, in order to insure this repeat business, have replaced rule-of-thumb processing methods with automatic quality controls—such as the Sylphon No. 921 Temperature Regulator shown in the inset photograph above.

This rugged, reliable instrument and its companion regulator, the Sylphon No. 923, are used throughout industry to keep temperatures at exact predetermined levels, save fuel, and protect you against product variations. Compact, self-powered and self-contained, they require little maintenance, rarely have to be serviced.

Catalog CG-20 offers complete details on construction, operation and application.

Write for your copy today.

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

FIRST WITH BELLOWS

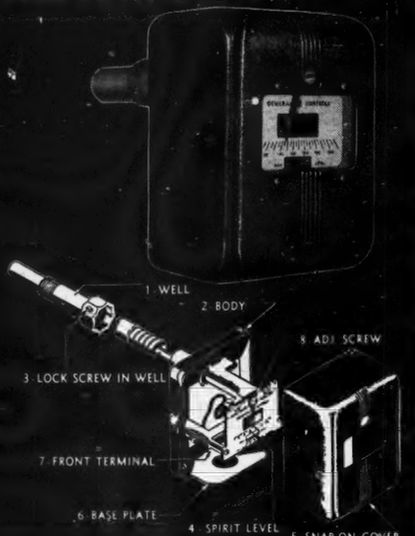
ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

New L-578 SERIES IMMERSION THERMOSTATS

8 FEATURES

1. **ACCURATE AND POSITIVE IN ACTION.** The result of design-simplicity.
2. **VISUAL LEVELING INDICATOR.**
3. **COMPLETE SELECTION OF TEMPERATURE RANGES AND SWITCH COMBINATIONS.** Models to meet every requirement.
4. **FAST REACTION TO LIQUID TEMPERATURE CHANGE.** Two-inch well provides large heat-exchange area for direct and proximity contact with temperature-sensitive element.
5. **CLOSE TEMPERATURE DIFFERENTIAL.** Approximately 10° F. in most installation conditions.
6. **TEMPERATURE SETTING EASILY CHANGED.** Just one external adjustment screw to turn.
7. **AMPLE CURRENT CAPACITY FOR USE IN ALL STANDING CONTROL SYSTEMS.** Up to 15 Amp. switch rating.
8. **MERCURY TYPE SWITCH.** Dust-proof, tamper-proof, impervious to corrosive atmospheric conditions and "pitting" characteristics.



GENERAL CONTROLS

801 ALLEN AVENUE GLENDALE 1, CALIF.

Manufacturers of Automatic Pressure, Temperature & Flow Controls

FACTORY BRANCHES: PHILADELPHIA • ATLANTA • BOSTON • CHICAGO • DALLAS KANSAS CITY • NEW YORK • DENVER • DETROIT • CLEVELAND • PITTSBURGH HOUSTON • SEATTLE • SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

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FOOD PROCESSING EQUIPMENT *A Problem?*

Tidewater RED CYPRESS

IS YOUR ANSWER!

A PROVEN FACT: Tidewater Red Cypress does not impart odor, taste, or discoloration to food with which it is brought into contact. This fact alone makes it ideal for such items as fermenting vats, processing tables, churns, pickle containers, etc.

A PLUS VALUE: This outstanding wood also offers extraordinary resistance to deterioration when used under adverse conditions such as extreme dampness, heat, etc.

SCMA Tide Water Red Cypress "The Wood Eternal"

LET US HELP YOU. WE INVITE INQUIRIES CONCERNING ALL TYPES OF TANKS AND VATS — FULLY FABRICATED OR PARTIALLY FABRICATED

FLEISHEL LUMBER COMPANY

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DR. I. J. HUTCHINGS

Dr. I. J. Hutchings has joined the research staff of H. J. Heinz Co., Pittsburgh, as head of the department of bacteriological research. He formerly was director of research and quality control for Grocery Store Products Co., West Chester, Pa.

Lt. Col. William D. Jackson, formerly chief of the control section, Army Forces, Western Pacific, in Manila, has been assigned command of the Technical Training Division, Quartermaster Food and Container Institute, Chicago.

Lester Janes, head of the finance division of Gerber Products Co., Fremont, Mich., has been made treasurer of the company.

F. H. Kullman, Jr., vice-president, Bowman Dairy Co., Chicago, recently was elected president of the Milk Industry Foundation. T. Kline Hamilton, Diamond Milk Products, Inc., Columbus, Ohio, vice-president.

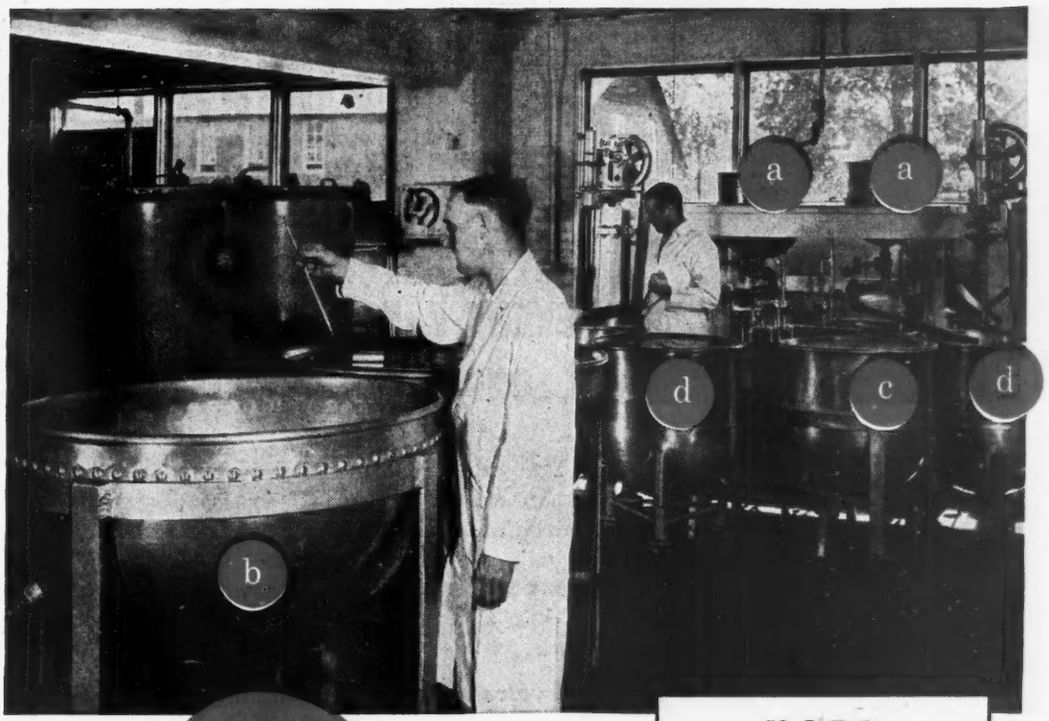
Dr. William C. Rose has been given the Award of Distinction by Grocery Manufacturers of America, Inc., in recognition of his many fundamental contributions to the science of nutrition, his studies of essential amino acids, the discovery, isolation and chemical identification of threonine and his leadership in nutritional biochemistry.

Dr. Betty Sullivan, research director, vice-president and member of the board of directors of Russell-Miller Milling Co., has been designated by the American Association of Cereal Chemists as the next recipient of the Thomas B. Osborne Medal Award for conspicuous achievement in cereal chemistry research. Presentation of the medal will be made at the 1948 annual meeting of the association in Cincinnati, in May.

Frank C. Verbest recently was elected president of Blatz Brewing Co., Milwaukee. William J. Janssen was re-elected vice-president and treasurer and James B. Croke was made secretary.

This is the case where

a and b sold c and d



You may know of many Wear-Ever steam-jacketed kettles that have served in *kitchens* for 20 or more years. But for real Wear-Ever durability, take the case of the Armand Company.

Back in 1916, they installed Wear-Ever kettles (A). So satisfactory were they, that larger kettles (B) were added in 1918. Then along came kettles (C), and finally when expansion called for more kettles in 1945, Armand Company turned again to Wear-Ever Aluminum.

And no wonder! 31 years is some wearability!

The aluminum alloy *now* used has *many* times the strength of the aluminum in those early models. Its hardness and resistance to wear means even *lower* maintenance costs, and *higher* efficiency than ever before.

Learn more about Wear-Ever Aluminum. Write: The Aluminum Cooking Utensil Company, 812 Wear-Ever Building, New Kensington, Pa.

MORE PRODUCTION PER HOUR

Wear-Ever Aluminum kettles give you such quick, even heating that users report more production per hour per kettle. And Wear-Ever Aluminum is friendly to foods, protecting purity, flavors and colors.

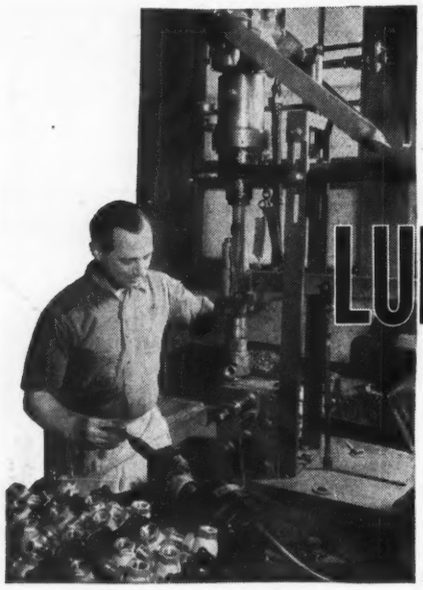
Watch for announcement of the NEW Wear-Ever Steam-Jacketed Kettle

WEAR-EVER ALUMINUM TRADE MARK

NOW... MORE WEAR THAN EVER IN

WEAR•EVER *Aluminum*

Made of the metal that cooks best



ASSEMBLING REQUIRES NO SPECIAL FITTING

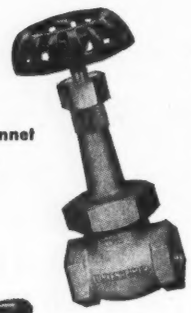
• Assembling is greatly simplified by Lunkenheimer precision production . . . parts are so accurately made that special fitting isn't necessary.

LUNKENHEIMER

Precision Workmanship

SUPER ACCURACY IN EVERY PART

...LONGER SERVICE LIFE



Bronze Union Bonnet Gate Valve

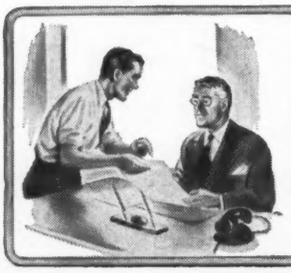
Fig. 1430 Iron Body Gate

• You can't fool the maintenance men on valve quality. They know that when a valve has a much longer than average service life, that valve has superior accuracy and precision built into it from handwheel to pipe threads.

Such valves are the only kind that Lunkenheimer has ever produced. For over three quarters of a century, the Lunkenheimer quality ideal has won ever widening acceptance until today it is a recognized tradition in American industry.

Lunkenheimer quality is the balanced combination of many factors. Among them are finest raw materials approved by constant testing and research . . . sound, advanced design . . . highly skilled workmanship . . . absolute accuracy . . . perfect alignment of all parts.

As an inevitable result — wherever you find Lunkenheimer Valves you find maintenance cost records consistently lower.



Your LUNKENHEIMER Distributor

— is an important link in the nationwide Lunkenheimer chain of better, more efficient, more reliable valve service. He is fully equipped to assist in the solution of valve maintenance and operating problems. In addition, he can make prompt arrangements to have a Lunkenheimer Engineer call at the plant whenever technical valve engineering knowledge is required.

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"QUALITY"

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DEATHS

Robert H. Cabell, 82, former president of Armour and Co., Chicago, December 17, in Ridgewood, N. J.

Joshua M. Chilton, 59, vice-president in charge of the grain department and director of Archer-Daniels-Midland Co., Minneapolis, December 8.

James J. Cuff, 73, executive vice-president and general manager of the Danahy Packing Co., Buffalo, December 26.

C. Wilson Desobry, 82 production manager for the Polk Sanitary Milk Co., Indianapolis, and winner or recognition as an inventor of dairy processing machinery, December 22.

William C. Lenth, 39, director of research, Jacques Manufacturing Co., Chicago, recently.

Frank T. Lewis, 65, consultant for Standard Brands, Inc., recently, in Indianapolis, Ind.

Fred J. Palmer, 75, former general manager of the Quaker Oats Co., Akron, Ohio, recently.

Claude Parcell, 55, treasurer and director of the International Association of Ice Cream Manufacturers and president of the Farmers Creamery Co., Fredericksburg, Va., recently.

Lawrence G. Preston, 62, most recently executive vice-president of American Maize-Products Co., New York, recently.

ASSOCIATED INDUSTRIES

Anchor Hocking Glass Corp., Pacific Coast Closure Division, has moved into its new factory at South Gate, Calif. The division's move was necessitated to obtain increased facilities for serving the West Coast closure trade.

John M. MacKenzie, assistant professor of mechanical engineering, has been made head of the recently established milling engineering division at the University of Minnesota, Minneapolis. The five-year milling engineering curriculum in flour mill engineering is sponsored and partially financed by the Millers' National Federation.

Reynolds Research Corp., Gary, Ind., has been acquired by Reynolds Metals Co., and will be operated as the plastics division of the parent company. The division manufactures a new film made from Geon latex and called Reynolon.

99+% PURE
MONO SODIUM
GLUTAMATE

- IN CANNED SOUPS
- IN VEGETABLES
- IN POULTRY
- IN MEAT
- IN SEAFOOD
- IN SAUCES
- IN SEASONINGS
- IN DRESSINGS
- IN FROZEN FOODS
- IN DRIED MIXES

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the flavor, quality, and taste appeals of your foods

Amino Products
DIVISION

You can use *Ac'cent* successfully in making even the finest prepared food more flavorful and appetizing because it intensifies the delicious flavors naturally present in quality foods. It adds distinction, character and sales appeal to many types of food, as is well known by famous gourmets and producers of nationally advertised food products.

Try *Ac'cent!* Test it! Our Technical Service Staff will supply samples and information on its use. *Ac'cent* adds no flavor or color of its own; it requires no change in basic formulas. You simply add *Ac'cent* in small quantities. You will find it effective and economical because it is always 99+% pure.

Ac'cent is available now, in 200-lb. drums, in a steady and expanding supply for your *regular* use.

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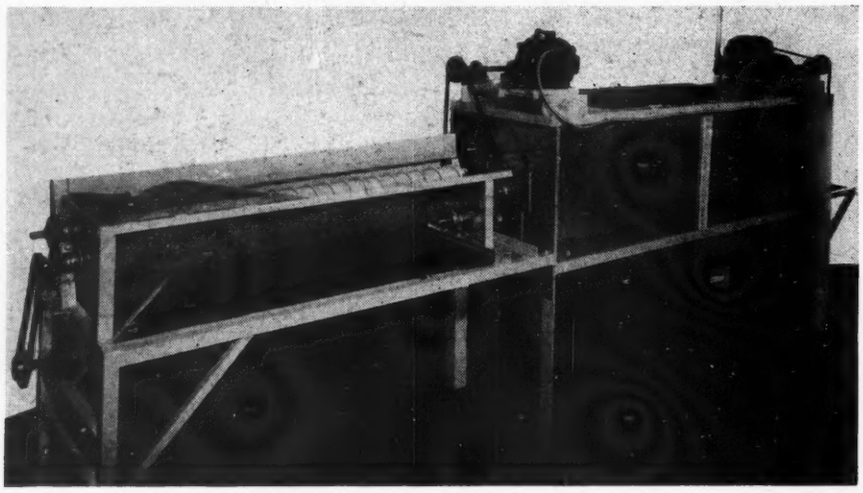
FOOD EQUIPMENT NEWS



Removes Dirt, Fungi, Peel Oil From Citrus Fruits 1

A MACHINE which processes citrus fruits to remove outside dirt, fungi and peel oil, has been developed and is being patented by Fraser-Brace Engineering Co., Inc., Dept. I, New York 16, N. Y. Operation is continuous and entirely automatic. Fruit may be delivered to the receiving hopper by conventional conveyors, from where they are automatically passed through the grating tunnel and discharged onto a standard conveyor for transportation to the juicers. In passing through the tunnel the fruit are subjected to sufficient abrasion to remove the entire surface to a depth of about 1/64 in. The machine will grate evenly the whole surface of the roughest and most misshapen fruit, yet it will not over-grate, leaving fruit firm enough for further handling through conventional conveyors and juicers.

While in the tunnel the fruit are sprayed with water, which carries off the oil from the peel and finely divided solids in the form of a slurry. Peel oil may be recovered by distillation, pressing or centrifuging. Since all of the oil from the peel is eliminated as well as the dirt and fungi, not only may better juice be obtained but more juice may be recovered.

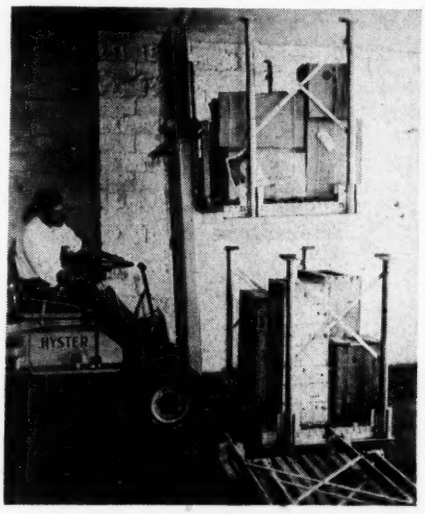
The machine is made in two sizes, a single tunnel grater for use in the marmalade and citrus candy industry, and a three tunnel grater which is capable of processing 50 boxes of medium size fruit per hour. The single tunnel grater requires one ½ and one ⅓ hp. motor, while the three tunnel grater requires two 1½ hp. motors. All contact surfaces are aluminum.

Automatic Side Sealer 4

A NEW automatic side sealer, designed to seal both ends of long, narrow, top-heavy cases that no "erect position" machine will handle, is announced by the A-B-C Packaging Machine Corp., Dept. I, Moberly, Mo. It is suitable for handling all thicknesses of corrugated containers and heavy solid fiber cases. Adjustment for case size is done electrically. Glue pots are available to assure an even thin flow of glue. Designed to handle up to 3,600 cases per hr.

New Stacking Pallet 5

TOBEY INTERNATIONAL CO., Dept. I, Los Angeles, Calif., announces a new aluminum pallet with 4 tubular col-



umns at the outside corners for supporting tiered loads. These columns fold down to the top of the pallet, thus facilitating handling and storage when not in use. The complete unit is fabricated of structural aluminum alloy. The dimensional load is 4x3x4 ft. high. Load capacity is 3,000 lb, per unit. Stacking can be accomplished by any fork lift truck of proper rated capacity. The pallet weighs only 53 lbs. empty, and is easily handled by one person when-columns are folded flat.

Truck Scales 2

A NEW four-section type truck scale with capacity up to 60 tons and 70 ft. length, said to be the country's largest scale for the exclusive use of weighing motor trucks and trailers, is announced by The Webb Corp., Dept. I, Webb City, Mo. The new model is made in 40, 50, and 60-ton capacities and from 45 to 70 ft. in length.

New Slide Rule 3

A NEW deci. log log slide rule, that simplifies computation, is announced by Pickett & Eckel, Inc., Dept. I, Chicago 3, Ill. The scales on the front of the rule are so arranged that only one setting of the hairline gives with each result its square root, cube root and logarithm. The log log scale on the back is expanded for greater accuracy, and arranged to give these 5 readings with each setting of the hairline: Decimal fraction to 4 and 5 figures; its reciprocal to 4 and 5 figures; logarithm; cologarithm and natural logarithm to base. The scales read from one ten-billionth to ten billion, and give decimal point location. A simple legend tells which scale to read when raising to powers. The slide rule is made of magnesium alloy with plastic surface bearing permanent, expanded, easy-to-read washable scales. Size is 12⅛ x 2⅛ x 3/16 in.

WRITE FOR MORE INFORMATION

Food Industries Reader Service now makes it easy for you to follow up the news on new equipment and new materials. Tear-out coupon cards are supplied for your convenience on the special colored page which follows the equipment news section in this month's issue. Enter your requests, fill out and mail cards, and let Reader Service do the rest.

Fluorescent Lighting 6

DESIGNED to meet all relighting requirements of the food processing industry is the new industrial fluorescent lighting fixture, RD-80, just announced by the Holdenline Co., Dept. I, Cleveland, Ohio.

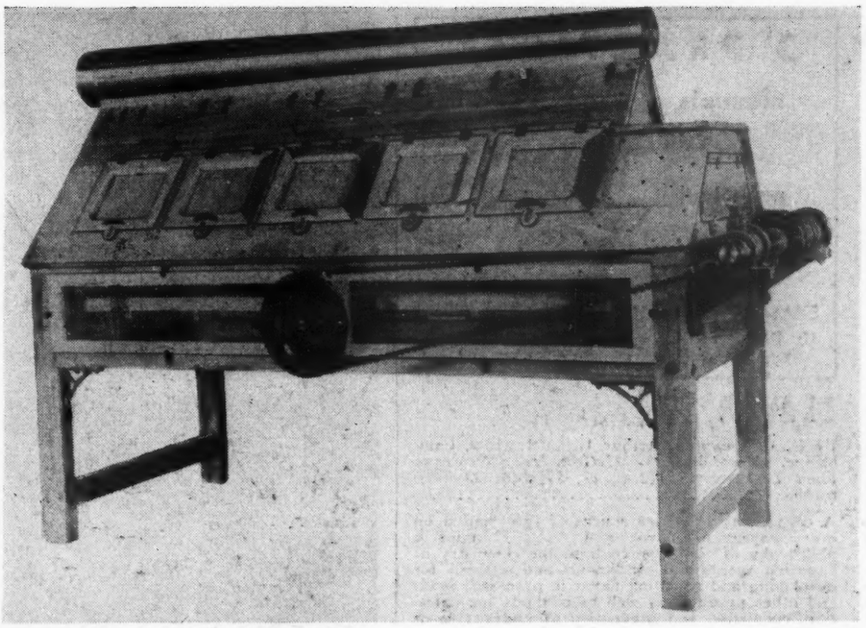
The unit will be furnished with vitreous porcelain enamel reflector, designed to a shielding angle of 14 deg., a reflectance factor of over 79 percent and an overall efficiency of about 80 percent. Watch-dog or no-blink starters and internally-mounted ballast, the new General Electric turret sockets and enlarged wireway for continuous runs will be standard equipment.

Sanitary Faucet 7

A NEW modern design sanitary faucet for general dispensing of all types of food liquids is made by Economy Faucet Co., Dept. I, Newark 1, N. J. It is easily taken apart for complete and simplified cleaning. Finger tip control gives a positive flow from a trickle to a full stream. A strong spring built in the faucet gives instant dripless shutoff. Available in stainless steel, chrome or brass, with ½-in. connections for application to any type of dispensing urn or container.

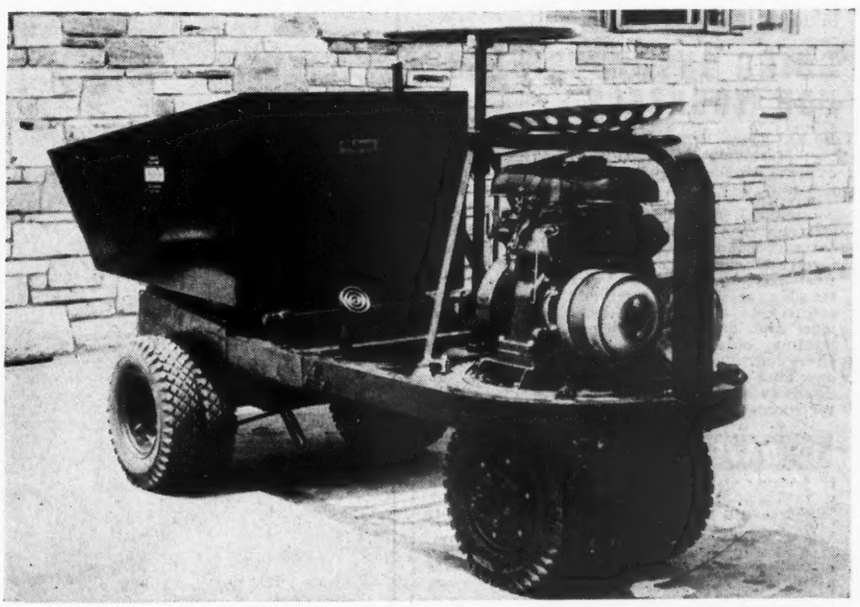
Multi-Purpose Mixer 8

To meet industry's requirements for a smaller, yet versatile unit having wide applications, National Engineering Co., Dept. I, Chicago 6, Ill., has just added a new unit to its line of Simpson intensive mixers for blending practically all types of dry, semi-dry and plastic material. Having a capacity of ¼ to ½ cu. ft. per batch, this mullertype mixer is designed primarily for the smaller production requirements, pilot plants and laboratory work. The unit is entirely self-contained, on a pedestal mount, measures 28 in. wide x 41 in. high. V-belt variable speed drive, requiring only 1½ hp., is accessible through removable front panel. Positive push-button electric control.



All-Metal and Wood Compartment Purifier 9

AN all-metal or wood compartment purifier for the milling industry is made by The Wolf Co., Dept. I, Chambersburg, Pa. It is designed with a tapered-top air chamber. Easily operated, metal slide air valves and cylindrical stainless steel air-duct assure better suction in lifting off the small bran particles, bee wings and impurities from the wheat middlings. The sieve is made up of different mesh cloths and cleaned by a brush, mounted on adjustable rails that moves from side to side underneath the sieve. A V-belt replaces the usual sprocket chain brush drive. The unit can be of all-metal or wood construction. The all-metal purifier is finished with Dupont Dulux white enamel. The outside may be finished in Dulux white enamel. Wood purifier can be shellacked and rubbed down to a smooth finish, or finished in Dulux white enamel. Built to suit individual specifications, the unit can be equipped with or without hopper.



Power Buggy Hauls 2,000 lb. or 12 cu. ft. 10

A POWER BUGGY which hauls 2,000 lb. or 12 cu. ft. at speeds from 2 to 15 m.p.h., forward or reverse, goes up a 25 deg. ramp. with a load, turns in its own radius, goes through doors and narrow passages and is fitted with a hitch for light tractor use, is made by Whiteman Mfg. Co., Dept. I, Los Angeles 5, Calif.

With single wheels the buggy is 28 in. wide, with dual wheels 36 in. wide. Standard wheelbarrow tires are used. Power is provided by a 6 hp., 4-cycle, air-cooled gasoline engine with an automatic clutch and variable speed changer worm gear reducer.

3 PRACTICAL

manuals for practical men

EXAMINE THEM 10 DAYS FREE

FLAVOR

By E. C. Crocker, Arthur D. Little, Inc., Cambridge, Massachusetts. *McGraw-Hill Series in Food Technology.* 172 *pages,* 5½x8½, 33 *illustrations* $3.00

A convenient reference source of information on every aspect of flavor and taste. Contains a philosophy of flavor perception, the chemistry of flavoring agents and condiments and methods for developing and retaining flavor in processed foods and other products as well as methods for detection, correction and prevention of undesirable or "off" flavors in commercial products. Gives an odor classification system, indicating the relative concentration of the four types of odor components, and contains a new and enlarged table of volatile chemicals used in flavoring.

THE CHEMICAL PROCESS INDUSTRIES

By R. Norris Shreve, Professor of Chemical Engineering, Purdue University, *Chemical Engineering Series,* 957 *pages,* 5¾x8¾, 256 *illustrations* $8.00

Offering a definitely new approach, the author follows modern factory practice in breaking down the actual industrial procedures into unit operations and unit processes, not only in the flow sheets, but in the supplementary text as well. An excellent one-volume treatise for anyone who wants to know how the products in the field are manufactured, the book presents a wealth of flow sheets, integrates chemical processes and unit physical operations, and covers modern advances in the field.

GOING INTO BUSINESS FOR YOURSELF

By O. Fred. Rost, Editor, Electrical Wholesaling; Marketing Editor, Business Week; Director, Surveys of Distribution. McGraw-Hill Publishing Company, 344 *pages,* 5½x8, 19 *illustrations*..$3.00

A practical, readable manual to help the reader start his own business with the best possibilities for success, no matter how little his experience. Covers all the major aspects of what it means to start your own business, what tangible and intangible assets are required and gives many pointers on choosing the right type of business, legal and financial problems, and methods of locating, organizing and operating the business. Gives important information applicable to starting *any* kind of retail store or small service shop; discusses essential guides and the opportunities for success in over 20 specific small businesses.

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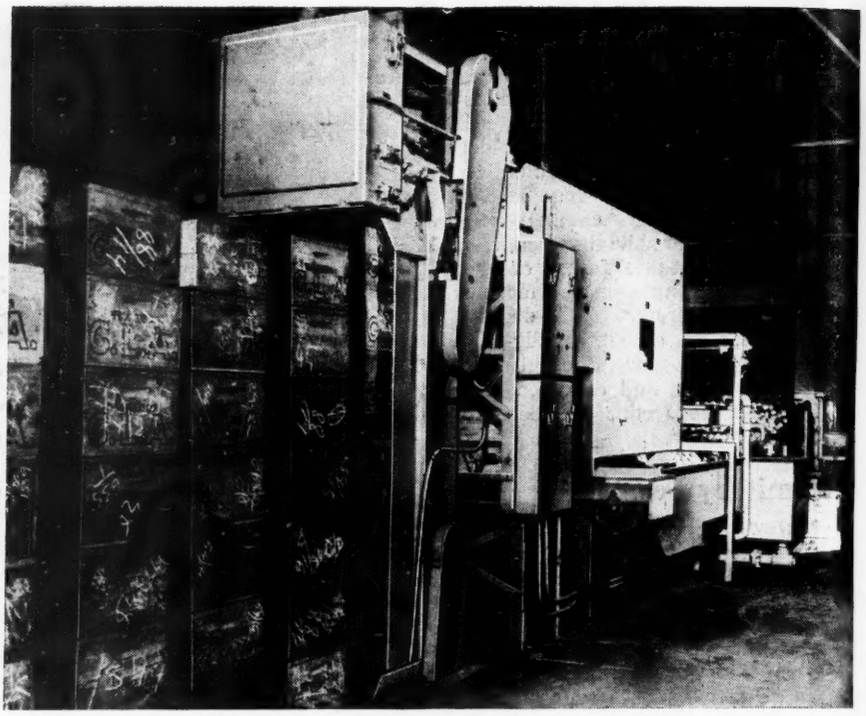
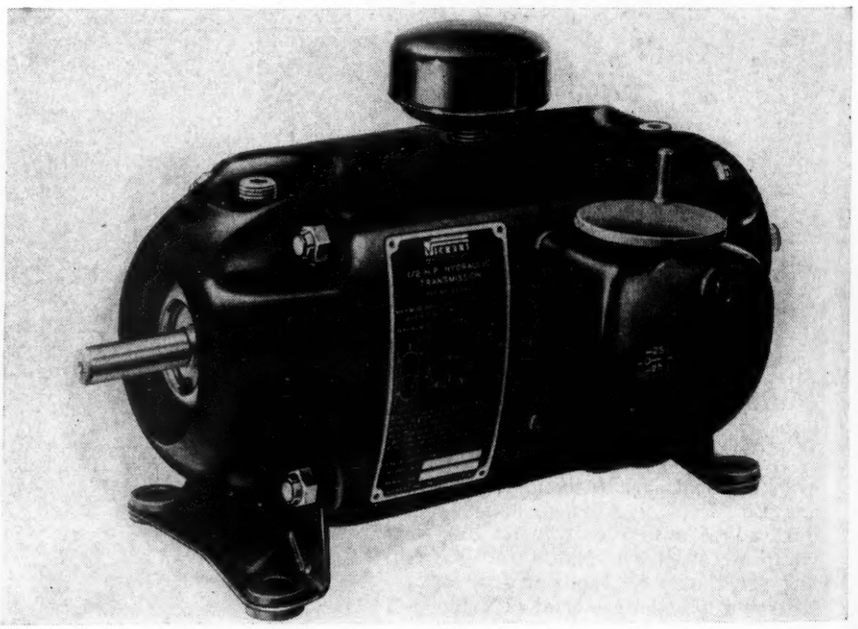


Rotary Automatic Lemon Dumping Unit 11

As many as 21 fully loaded lemon-picking lugs per min. can be fed to the washer by the new automatic lemon dumping unit of Food Machinery Corp., Dept. I, Riverside, Calif. Controlled electrically from one central panel board, the unit consists of field lug unstacker, rotary dumper, trash eliminating dump tank and roll elevator all combined as one coordinated machine. This unit gives the packing house management control of the fruit flow right at the beginning of the operation, enabling them to increase the house's capacity when desired.



Variable Speed Hydraulic Transmission 12

Vickers Inc., Dept. I, Detroit, Mich., announces the development of a new, variable speed hydraulic transmission for fractional horsepower machinery drives. Features include smooth and stepless speed adjustment from zero to maximum output rpm., in either direction of rotation. Full and constant torque power characteristics are maintained throughout the entire speed range. The input shaft may be driven in either direction without mechanical change. The unit may be stalled without damage. Speed adjustment over complete range, is obtained by handwheel or servo control.

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Get New Clutch Service at 2/3 the Cost

AVAILABLE NOW FROM YOUR INTERNATIONAL DEALER OR BRANCH

INTERNATIONAL Factory-Rebuilt EXCHANGE CLUTCHES

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Tune in James Melton on "Harvest of Stars!" NBC Sundays.

THIS EMBLEM IDENTIFIES GREAT TRUCKS
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INTERNATIONAL Trucks

SPRAY TROUBLE? Consult MONARCH

Fig. 629

Are all of your processes using Spray Nozzles as efficient as you think they could be? Do the Sprays distribute the liquid evenly? Break it up into as fine particles as you would like? Resist the corrosion or wear conditions satisfactorily?

Send Monarch an outline of any spray problem—if your liquid can be sprayed with direct pressure at all Monarch can furnish the nozzles.

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Do you have our Catalogs 6A and 6C?

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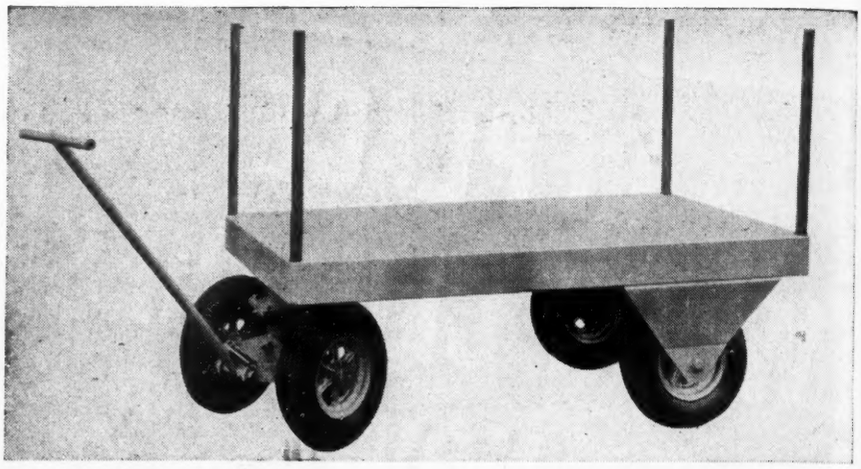
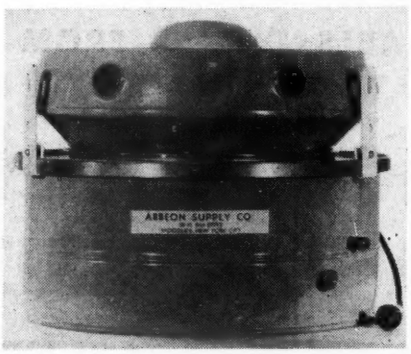


Indoor-Outdoor Pneumatic Wheeled Truck 13

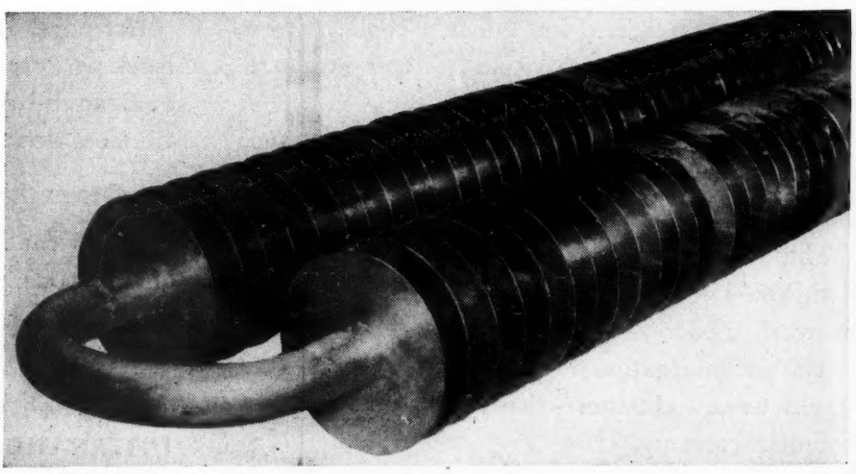
THE Market Forge Co., Dept. I, Everett, Mass., has announced the addition of a new standardized truck for those plants which require trucks to be handled both indoors and outdoors, and where quietness of operation, cushioning of load or unsatisfactory floors make this type unit desirable. Truck can be furnished with suitable devices for hauling by tractor, truck or auto. It has a rated capacity of 2,500 lb. Height above the floor is 22 in. It is 30 in. wide and has 60 in. length of loading space. It is furnished with four 16-in. diameter pneumatic wheels mounted on roller bearings.



Industrial Humidifier 14

AN industrial humidifier that requires no steam, no pumps, no compressors, is completely self-contained and atomizes moisture in a vapor form finer than cigarette smoke, is made by the Walton Laboratories, Inc., and distributed by the Abbeon Supply Co., Dept. I, Woodside, N. Y.

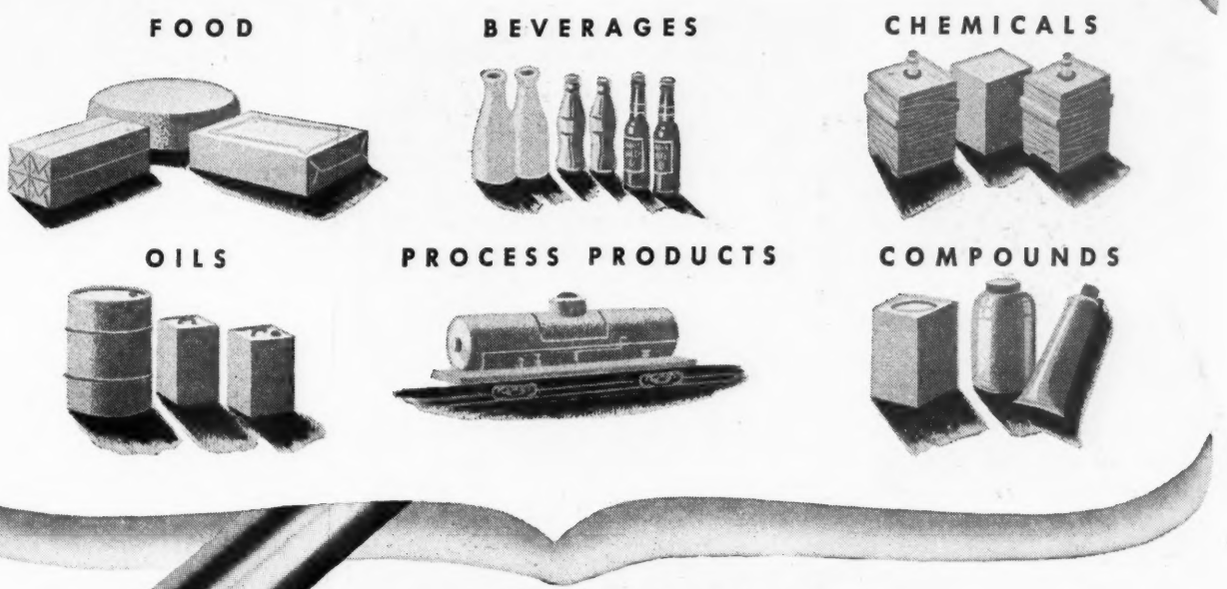
The lower pan of the unit is completely covered and air is brought in from the bottom through a fiber-glass filter. To install it is only necessary to hang the unit from the ceiling.



Disc Fin Coil Saves Weight, Space, Refrigerant 15

A REFRIGERATION coil with disc fins that weighs less, requires less space and less labor in hauling and installation, and needs less refrigerant to provide a given service, is a new product of the Howe Ice Machinery Co., Dept. 1, Chicago, Ill. In construction, the 7-in. dia. fins of 16 gage steel are united, 1½ in. apart, with 14 gage steel tubing of 2 in. overall dia. by a specially designed machine which expands the tubing into the fins. With a perfect bond thus assured, the entire coil is then hot galvanized. The coil is made in three standard lengths: 8 ft. 6 in.; 10 ft. 6 in., and 12 ft. 6 in. overall. Coils are furnished with plain ends, welded "U" or hair pin bends, with square or oval flanges, or couplings.

Specify STAINLESS for protection of product purity



Specify GLOBE for Stainless Steel Tubes of uniformity and quality

OUTSTANDING for protection against corrosion and product contamination, stainless steel tubing has won an important place in the production and processing of America's foods, beverages, chemicals, oils, and other process products.

Stainless steel tubing has no cracks or crevices and because the walls are stainless steel straight through, daily scouring only adds to its polish and keeps it brightly clean and sanitary. Since it has no coatings to wear through stainless steel tubing develops no pockets to harbor bacteria.

Since stainless steel tubes are available in many analyses, care should be taken in selecting the stainless steel tubing of the right alloy for a specific application.

Globe stainless steel tubing is available polished inside and out in both seamless and welded (Gloweld) types.

With Globe's wide experience in supplying industry with stainless steel tubing of uniformity and quality you can be sure of safety and sanitation when you specify "GLOBE."

Write for Bulletin No. 115 giving complete information on Globe stainless steel tubing.

GLOBE STEEL TUBES CO., Milwaukee 4, Wis., U. S. A.

3010

GLOBE STEEL TUBES

GLOBE TUBES

★ Pressure Tubes
★ Condenser & Heat Exchanger Tubes
★ Seamless Stainless Steel Tubes
★ Globeiron High Purity Iron Seamless Tubes
★ Gloweld Welded Stainless Steel Tubes
★ Mechanical Tubing

Look into Everything ROLLER CONVEYORS Can Do . . . Ask STANDARD CONVEYOR

ROLLER conveyors are unequalled in low first cost, flexibility and minimum operating expense. They handle a wide range of commodities — parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. They are available in light, average, or heavy-duty types for either portable or stationary use —in a wide variety of sizes, styles, sections and lengths. Roller conveyors are built in their entirety by Standard, including the vital bearings which are manufactured to the highest standards.

Besides roller, Standard builds belt, chain, slat, and push-bar conveyors, also spiral chutes, portable pilers and conveying units, and pneumatic tube systems.

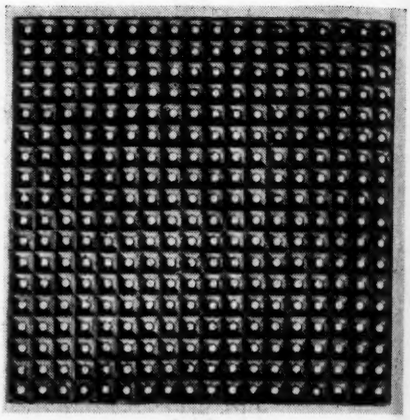
On any conveyor requirement Standard Conveyor is equipped by experience and facilities to recommend and furnish the right type of equipment.

Write for Standard's valuable reference book "Conveyors by Standard" — Catalog No. FI-18.

STANDARD CONVEYOR CO.
General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities

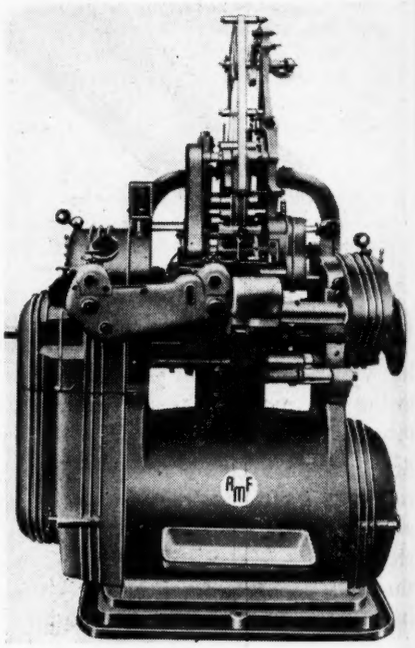
Standard
GRAVITY & POWER
CONVEYORS

ROLLER · BELT · SLAT · PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS



Pyramid Backing Plate 16

A PYRAMID backing plate for use with filter screens of all types that gives a maximum of open area back of the filter screen as distinct from normal backing plates is announced by the Pyramid Industrial Screen Co., Dept. I, Brooklyn, N. Y. Filtration begins at the base of the pyramid-like depressions, instead of inside the perforations of a standard backing plate. It is claimed that this results in as much as double the open area for filtration.



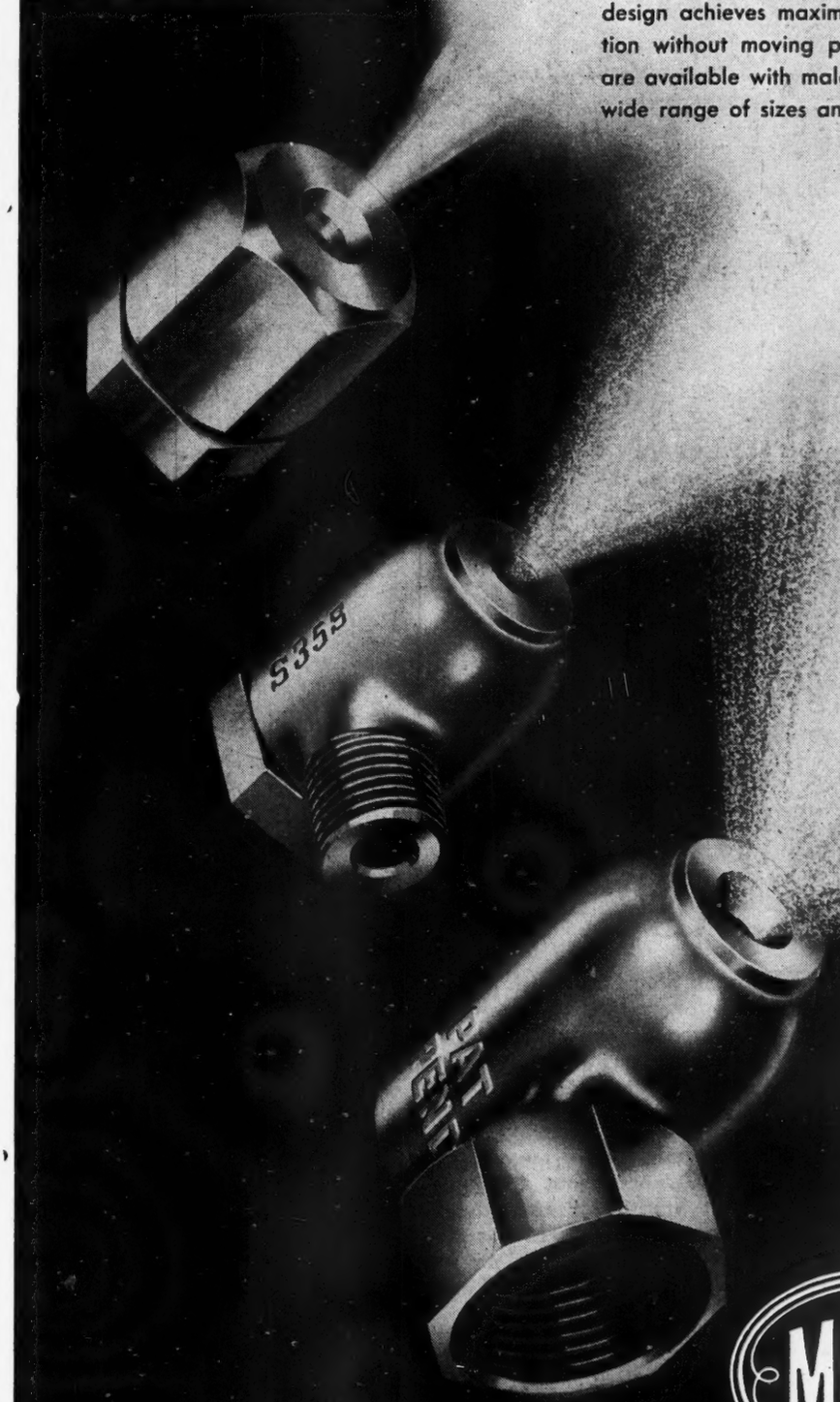
Candy Wrapper 17

AMERICAN MACHINE & FOUNDRY Co., Dept. I, New York 17, N. Y., sales agents for Rose Bros., Gainsborough, England, announce a candy wrapping machine that fold wraps with seam and ends on the underside of the piece at a rate of 500 per min., or twist wraps with neat fantail ends at a speed of 650 per min. Different size pieces can be wrapped in wax paper, transparent Cellophane or wax-backed foil wrapping material. Other features include: V-belt drive, fully continuous material and paper feeds; paper cut by high-speed rotary knife;

MARLEY NOZZLES

3 Ways to Perfect Sprays

One of these three Marley Patented Spray Nozzles will perform with peak efficiency in any spray requirement. The patented design achieves maximum break-up and uniformity of distribution without moving parts. Of durable bronze, these nozzles are available with male and female pipe connections; and in a wide range of sizes and capacities.



ATOMIZING NOZZLE: For any service requiring a mist-like spray, such as maintaining humidity for heating and processing, conditioning perishable foods, and for atmospheric absorption. It is fitted with a Monel metal screen to prevent clogging and may be cleaned easily.

TWO-PIECE NOZZLE: Features the removable plug for quick cleaning without removal from pipeline. In any service where clogging is a problem, the Marley Two-Piece Nozzle is the answer.

ONE-PIECE NOZZLE: Built for maximum uniform output at lowest pressure. This nozzle is non-clogging under normal conditions and will render years of efficient trouble-free service.

Write for Marley Nozzle Bulletins or ask a Marley Application Engineer to assist in selecting the proper nozzles for your job.

MARLEY NOZZLES

THE MARLEY COMPANY, INC. • KANSAS CITY 15, KANSAS

"It's clear to us"

That's what you hear from users of Wyandotte Steri-Chlor.* It's *clear* to them that this germicide and deodorant — which makes an absolutely *clear* solution — is the safest to use in food plants.

Steri-Chlor solutions are stable . . . you can use them without danger at high temperatures. This means efficiency in action and rapid drying of the surface where they are applied. And Steri-Chlor imparts no taste or odor to foodstuffs.

The use of Steri-Chlor with powdered soap for washing hands gives a high degree of sanitary protection. It is recommended wherever foods and beverages are handled, processed or dispensed.

Your Wyandotte Representative will tell you more about the advantages of Steri-Chlor and other Wyandotte products for each and every cleaning need in food-processing plants. Why not call him today?

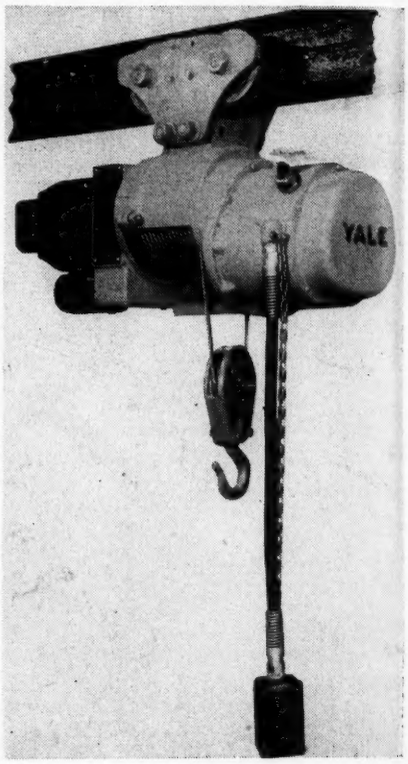
*Registered trade-mark.

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION • WYANDOTTE, MICHIGAN

Service Representatives in 88 Cities

heat sealing device; tachometer, indicating operating speed; working parts accessible for cleaning and lubrication; main drives run in oil. Principal parts are ground, hardened and polished.



Electric Hoist 18

A NEW wire rope electric hoist, available in ¼, ½, ¾ and 1-ton capacities is announced by the Yale & Towne Mfg. Co., Dept. I, Philadelphia 24, Pa. The main hoist frame is a heavy, one-piece ribbed-steel casting, constructed for use with hook, lug, plain trolley, motor trolley or winch-type mounting. The large diameter drum, with machine cut grooves for guiding the cable as it winds, has sufficient capacity to provide for full standard length without overlap of cable. Simplicity in design, standardized interchangeability of repair parts, and small over-all dimensions are features which reduce production costs and make this hoist available at low cost.

1,000-Lb. Fork Truck 19

A CENTER-CONTROL fork truck for plants where narrow aisles, congested areas, limited floor capacity, small and low capacity elevators are a factor, and wherever loads can be limited to 1,000 lb., is announced by The Baker Industrial Truck Div. of Baker-Raulang Co., Dept. I, Cleveland 13, Ohio. It meets the needs of small plants that cannot justify the first cost of more expensive equipment, small warehouses, small distributors, and many large plants where special conditions exist. The truck has a 36-in. wheelbase and an overall length, exclusive of forks of 53-⅝ in.

NEW... EXCLUSIVE!

Nibcoloy

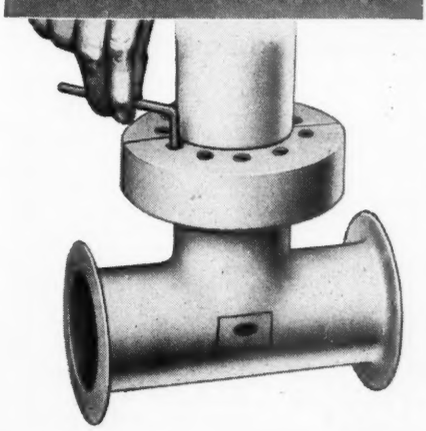
Lock Flange Fittings

Patent applied for

Illustration shows half of Lock Flange removed

Simplest, most economical method of installing demountable alloy piping

ONLY TOOL NEEDED IS THIS LITTLE WRENCH



Just a few twists with a set screw wrench and you break a NIBCOLOY Lock Flange joint—for inspection, cleaning, renewing gaskets, or for a change in the line itself. The simple, direct connection is just as easily restored... Fittings are available in Inconel, Nickel and Monel and stainless steel (Types 316-347-304). Lock Flange is manganese bronze, Drive Ring of stainless steel and set screws are rust-proofed carbon steel... NIBCOLOY lock flange fittings can be produced to meet your specific needs. Your detailed inquiry is solicited. Mail coupon for Catalog 902 covering the entire line of NIBCOLOY wrot fittings.

Northern Indiana Brass Co., 205 Plum St., Elkhart, Indiana.

Please send your catalog 902, including complete information about the exclusive New Nibcoloy Lock Flange.

Individual_____

Company_____

Address_____

NOW! NEW!

Deltaxin

Trade Mark Reg. U. S. Pat. Off.

WINTHROP-STEARNS' BRAND OF CALCIFEROL

PURE CRYSTALLINE VITAMIN D_2

For Fortification of Fluid Milk and Other Foods

Why not use Vitamin D in its *purest, most potent form* for easy, accurate, economical fortification of fluid milk?

DELTAXIN dissolved in propylene glycol is an outstanding vitamin D concentrate with these advantages:

1. Contains purest known form of vitamin D_2 with uniform potency, not affected by pasteurization.

2. Propylene glycol as solvent insures rapid and thorough dispersion of vitamin D.

3. Simply "measure-and-add" direct to milk, saves time and money.

4. Stable, does not become rancid, does not affect color, odor or taste of milk.

5. No changes in your production set-up, no emulsifiers or extra equipment, no license or royalty fees.

The Council on Foods and Nutrition of the American Medical Association has declared Calciferol in Propylene Glycol suitable for the fortification of Council accepted vitamin D milk.

Sold in four sizes for the convenience of small and large dairies.

Special Markets Division
WINTHROP-STEARNS Inc.
170 Varick Street, New York 13, N. Y.

Sole Manufacturer Under U. S. Patents 1,902,785 and 2,030,792

SPECIAL MARKETS DIVISION PRODUCTS

B-E-T-S*—The original Food-Enrichment Tablet for Bread and Macaroni Products.

VEXTRAM*—The First Starch Base Mixture for Enrichment of Flour, Corn and Macaroni Products.

OXYLITE*—An Improved Flour Bleaching Agent.

TRIDEE*—Vitamin D_3, Activated 7-dehydrocholesterol, for Vitamin D Fortification of Animal Feeds.

DELTAXIN*—Winthrop-Stearns' Brand of Calciferol, *Pure Crystalline Vitamin* D_2, for Fortification of Fluid Milk and Other Food Products.

PURE CRYSTALLINE VITAMIN D_3—For Fortification of Evaporated Milk.

ASCORBIC ACID—To retard browning, retain flavor of Frozen Fruits.

Pure Crystalline Vitamins in Bulk

Vitamin B_1 — Niacin
Vitamin B_2 — Niacinamide
Vitamin B_6
Calcium Pantothenate

AMINO ACIDS

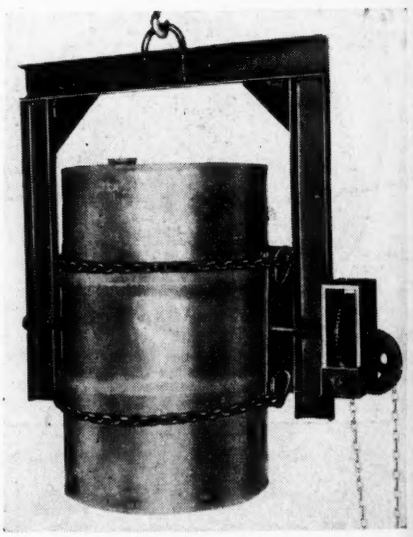
*Trade Marks Reg. U. S. Pat. Off.

To make a right angle turn the truck requires only 67-½ in. plus the length of the load, and since the truck is designed for a 1,000 lb. load, 30 in. long, a right-angle turn can be made in 97-½ in. Dimension from the center of the drive wheels to the heel of the forks is only 7-½ in., which contributes materially to fore-and-aft stability. To operate the truck the driver, from a seated position, places his right foot on a treadle which operates a foot switch connected in the contactor circuit.

Modified Valves 20

HANNA Unitite valves for air and hydraulic lines have recently been redesigned to incorporate a new protective dust seal. The seal consists of a neoprene skirt mounted on the valve stem underneath the handle to snugly shroud the boss on the bonnet. It is claimed that this seal will add considerably to the life of the valve.

A modification has also been made in the lubrication fitting. This fitting is mounted in the stem so that the valve disk and stem are pressure lubricated radially outward from the center. Lubrication is accomplished without taking the valve out of service or shutting off the flow. Valve is made by Hanna Engineering Works, Dept. I, Chicago 22, Ill.



Drum and Barrel Tilt 21

A NEW drum and barrel tilt, designed to simplify materials handling and completely eliminate hand dumping, is made by the Palmer-Shile Co., Dept. I, Detroit 27, Mich. The unit has 1,000 lb. capacity for standard 55-gal. drum or barrel. Special sizes or capacities can be built to suit individual requirements. Equipped with safety style locking devices that hold barrel securely without slippage. Barrel can be turned 360 deg. Turning mechanism incorporates the worm drive principle and is available in hand chain models. Constructed of heavy structural steel, completely welded throughout. Weight is approximately 125 lb.

It's *Glass* for cleanliness...

NOTHING can be cleaner or more sanitary than the hard, smooth, brilliant surface of a glass container. Food packed in glass gives absolute assurance that it will remain clean and sanitary until entirely used. Glass is inert—adds no foreign taste or aroma to its contents. All the flavor, quality, color and tasty goodness are protected by an Anchorglass container. It is easy to open, easy to reseal and easy to keep clean. Your products reach consumers exactly as you pack them. Remember, too, "cleanliness" is only one of the many reasons why glass containers will help sell your products.

Anchor CONTAINERS and CAPS

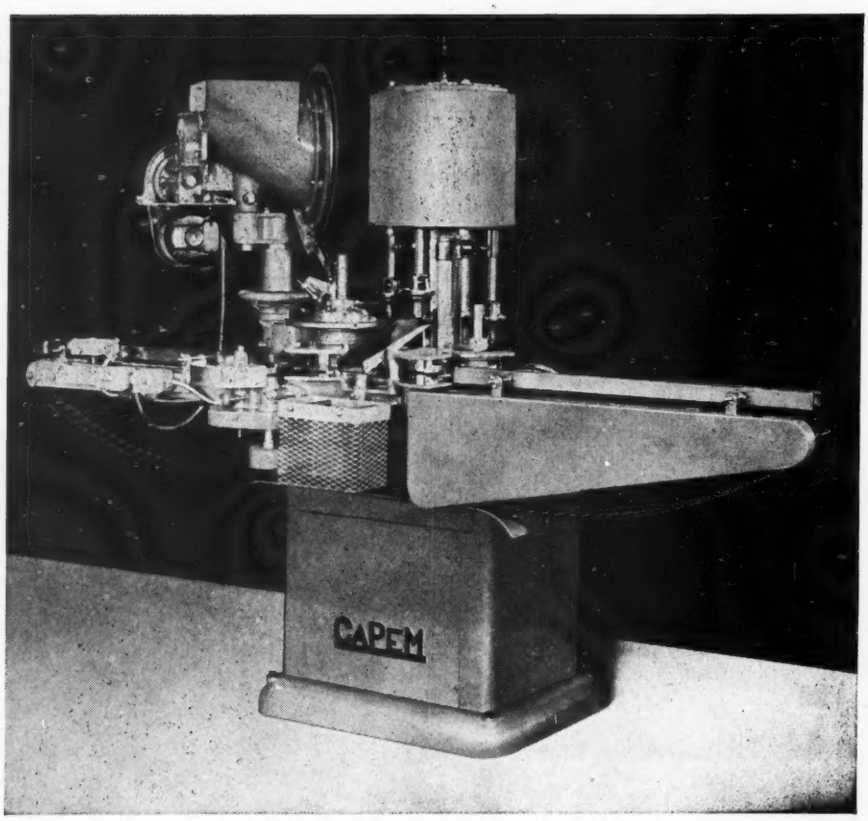
PRODUCTS OF
ANCHOR HOCKING GLASS
CORPORATION
LANCASTER, OHIO

AND IT'S *Anchorglass* FOR MAXIMUM CLEANLINESS

"Crime Photographer," Thursday evenings, entire CBS network, sells all America on glass-packaged products.

CAPEM

THE MODERN SCREW CAPPER



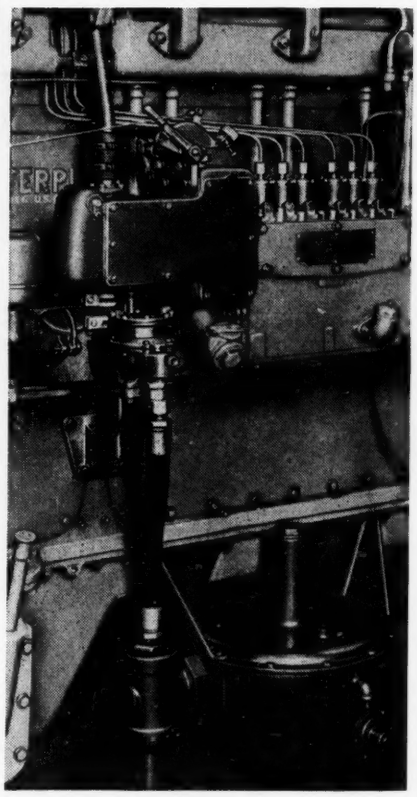
- Applies any type of standard screw cap or cover at speeds of 2000 to 10000 per hour.
- Takes container from conveyor line, applies cap perfectly, and returns container to conveyor AUTOMATICALLY without intermediate handling.
- Handles bottles, jars, cans or jugs of any size or shape.
- Delivers a perfect, LEAKPROOF seal at low cost.
- Available in 1, 2, 4, 6 and 8 spindle models.

Write for prices and delivery.

CONSOLIDATED PACKAGING MACHINERY CORP.
BUFFALO 13, N.Y.

Neoprene Gloves 22

PURE white neoprene gloves that give women workers in canneries and other food plants barehand efficiency are announced by The Pioneer Rubber Co., Dept. I, Willard, O. Four important advantages in design are: Short fingers that always fit snug at the tips; curved fingers providing a roomier palm; satinized inside, no talcum needed, and non-slip finish that is said to hold wet slippery objects more firmly than bare hands and to add strength and wearing quality to the gloves. Made in 3 sizes—small, medium and large.



Dual-Fuel Diesel Unit 23

A DUAL-FUEL attachment for service with the Caterpillar diesel D13000 engine, which is of particular interest to engine users in, or near, gas producing areas where pipe line gas can usually be obtained at low cost, has been placed in production by Caterpillar Tractor Co., Dept. I, Peoria, Ill. In industrial areas, where "dump gas" rates prevail during the summer months, this low cost gas can be used, changing back to full diesel operation for the balance of the year or for those situations when the engine may be moved to a new site where gas is not available.

The attachment consists of special precombustion chambers, modified fuel injection pumps for precise metering of minute quantities of diesel fuel, a special governor control assembly for interconnected fuel injection pump and gas throttle valve, and the necessary gas lines and pressure regulators. Once the initial conversion parts

CATALOGS, BULLETINS

This digest of manufacturers' new publications is offered by FOOD INDUSTRIES Reader Service as a convenience for executives. The editors feature catalogs, data sheets and technical pamphlets likely to interest purchasing agents, superintendents, packaging men and food technologists.

Food Plant Equipment

Solvent Extraction 51
Allis-Chalmers—New 20-page bulletin summarizing the experience gained in engineering, installing and operating the numerous continuous solvent extraction plants it has pioneered in the vegetable oil industry in the last 10 years.

Ion Exchange 52
Liquid Conditioning Corp.—Bulletin 12 on treatment of process liquids.

Rotary Pumps 53
Worthington Pump & Machinery Corp.—Bulletin W-487-BIOB, "Worthington Heavy Duty Rotary Pumps." Contains descriptions, illustrations, performance chart, tables of sizes and displacements.

Magnetic Pulley 54
Dings Magnetic Separator Co.—Catalog No. 260-A describing the new Perma-Pulley, a permanent Alnico magnetic head pulley for belt conveyor systems. It includes dimensions, capacities, weights and other specifications, and describes the design of the unit.

Sirup Room Equipment 55
Frank B. Lomax Co.—16-page catalog illustrating and describing Lomax stainless steel sirup room equipment.

Illuminated Magnifier 56
E. W. Pike & Co. new complete catalog on the Pike Flash-O-Lens, illuminated magnifier used for all types of inspection. All models, both battery and electric types, are illustrated and priced. Detailed information is given on the uses in milk and dairy products; paper, labels, stamps; photographs and engravings; seed and grain, medical examinations and plant first aid fields.

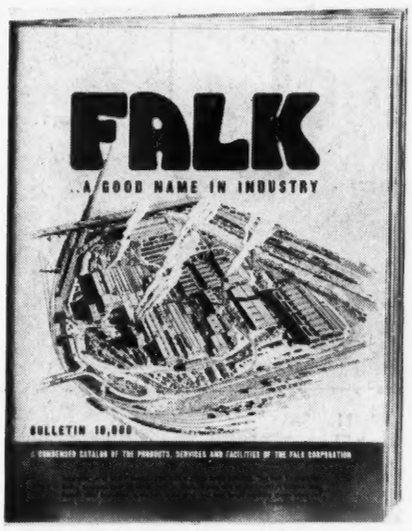
Bacon Machinery 57
The Allbright-Nell Co.—Folder No. 56 describing and illustrating the hydraulic bacon press, hydramatic bacon slicer and packing conveyor.

Drier 58
Link-Belt Co.—12-page book No. 2209, "The Link Belt Multi-Louvre Dryer." Describes, with photographs, line drawings and dimension tables, the applications of this new drier which is particularly suited to materials requiring rapid drying and cooling.

Process Equipment 59
The Jeffrey Mfg. Co.—52-page catalog 804 illustrating and describing Jeffrey Traylor electric vibrating process equipment. Describes driers, coolers, packing tables, conveyors and auxiliary equipment. Also controls, chains and sprockets, transmission machinery.

Packaging Machinery 60
Triangle Package Machinery Co.—16-page illustrated bulletin designed to give a cross-sectional view of the broad application possibilities of Triangle package machinery for handling all kinds of dry products.

Precision Products 61
The Falk Corp.—New 12-page bulletin 10,000 contains descriptions and illustrations of all Falk precision products, such as gears, speed reducers, Motoreducers, couplings, high speed drives, backstops, marine and special gear drives.



Gyrating Screens 62
Simplicity Engineering Co.—4-page folder on their line of gyrating screens for fine screening and dewatering. Contains information on their applications in food and allied industries.

Non-Pulsating Pump 63
Robbins & Myers, Inc.—4-page illustrated folder describing the R&M Moyno standard pump for positive pumping without pulsation.

Pumps 64
Warren Steam Pump Co., Inc.—6-page bulletin 244 on the Type TH six-stage, high pressure pumps. Contains descriptions, exploded views and material specification table.

Filters 65
Niagara Filter Corp.—10-page illustrated bulletin describing Niagara brewery filtration equipment.

Packaging Machine 66
Battle Creek Bread Wrapping Machine Co.—4-page illustrated folder describing the Model BT 30 packaging machine.

Valves 67
Jenkins Bros. — 12-page illustrated folder describing the new Fig. 270-U bronze gate valve with monel seat rings.

Meat Trucks 68
The Standard Casing Co. — 4-page folder, bulletin S-47, describing and illustrating their line of stainless steel meat trucks and stuffing and trimming tables.

Pasteurizers 69
Steriline Dairy Equip. Div. of Steel & Tube Products Co.—6-page folder illustrating and describing the batch type pasteurizers made by this company.

Filters 70
Republic Filters, Inc.—4-page folder illustrating and describing the different filters made by this company.

Ultra Violet 71
Elenite Products, Inc.—6-page folder describing and illustrating Elenite ultra-violet water sterilizers and Elenite steril-hood.

Oat Crimper 72
Sprout, Waldron & Co.—2-page bulletin describing the improved oat crimper made by this company.

Labeling Machines 73
Pneumatic Scale Corp., Ltd.—10-page bulletin No. S-110, "Precision Labeling by Pneumatic." Describes, with photographs and diagrams, this company's complete line of labelers.

Tanks 74
Metal-Glass Products Co. — 12-page catalog, "Modern Design San-I-Tanks," describes, with illustrations and capacity tables, the complete line of stainless steel tanks and accessories made by this company.

Wrapping Machine 75
Package Machinery Co.—4-page folder on Model FA package wrapping machine. Contains application photographs and specifications on the three models for wrapping different size packages.

Industrial Wire Cloth 76
Buffalo Wire Works Co., Inc.—4-page folder, No. 597, "Buffalo Galvanized After Woven Industrial Wire Cloth." Describes Buffalo's method of weaving and galvanizing, cleaning and pickling.

Blowers and Exhausters 77
United States Hoffman Machinery Corp. — 12-page booklet, A-650, de-

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Better foods made possible by Better packaging in . . . . .

Inland Steel Containers

No. 551B8 LEVER LOCKING RING DRUM

No. 5538 STANDARD SHIPPING BARREL

No. 584 LUG COVER PAIL

No. 514X LEVER LOCKING RING PAIL

No. 584R SWIVEL-SPOUT POR-PAIL

No. 594Q CLOSED TOP PAIL

1. **Air tight sealing.**
2. **Positive protection from contamination.**
3. **No leakage.**
4. **No damage in shipping.**

Features of Inland Steel Containers, drums and pails, that enable producers of food products to get the finest in quality to consumers without loss of original freshness, flavor, or color.

There is an Inland Steel Container suitable for every food product.

INLAND STEEL CONTAINER CO.

Container Specialists

6532 SOUTH MENARD AVENUE, CHICAGO 38, ILLINOIS

PLANTS AT: CHICAGO - JERSEY CITY - NEW ORLEANS

scribing many applications of Hoffman blowers and exhausters on production operations which require air pressure from 1-8 lb. per sq. in. or vacuum from 2 to 11½ in. Design features are explained graphically, operating characteristics and advantages are described, charts showing capacity ranges and page of tables are included.

Beverage Mixer **78**
Potter & Rayfield, Inc.—Folder on the new P&R low-cost beverage mixer with a varying capacity up to 120 bottles per min.

Sausage Grinders **79**
John E. Smith's Sons Co.—16-page illustrated catalog G describing the complete line of sausage grinders made by this company.

Materials Handling

Materials Handling **80**
Syntron Co.—92-page illustrated catalog describing their complete line of vibratory material handling equipment which includes electromagnetic vibrators, packers, vibratory feeders, dry feeder machines, weighing feeders, grizzlies, lawns, paper joggers, hopper level switches, explosion-proof hydraulically operated feeders, vibrators, jolters and feeder machines and mechanical shaft seals, and their construction and maintenance tools.

Gravity Conveyor **81**
The Rapids-Standard Co., Inc. — Single-page, 3-color bulletin showing prices and specifications of the new light-weight aluminum Rapid-Wheel gravity conveyor.

Conveyor System **82**
J. W. Greer Co.—10-page bulletin, "The Greer Multi-Tier Conveyor," for continuous straight line production. Profusely illustrated with photographs and line drawings.

Fork Truck **83**
Crescent Truck Co.—6-page illustrated bulletin describing the Crescent "Aisle Saver."

Conveyors **84**
Standard Conveyor Co.—16-page bulletin No. 61 illustrating and describing nine types of standardized gravity and power conveyor units.

Control Equipment

Beverage Plant Controls..... **85**
Taylor Instrument Companies—8-page bulletin 98048, "Taylor Fulscope Recording Carbonation Control and Other Taylor Instruments for Beverage Plants."

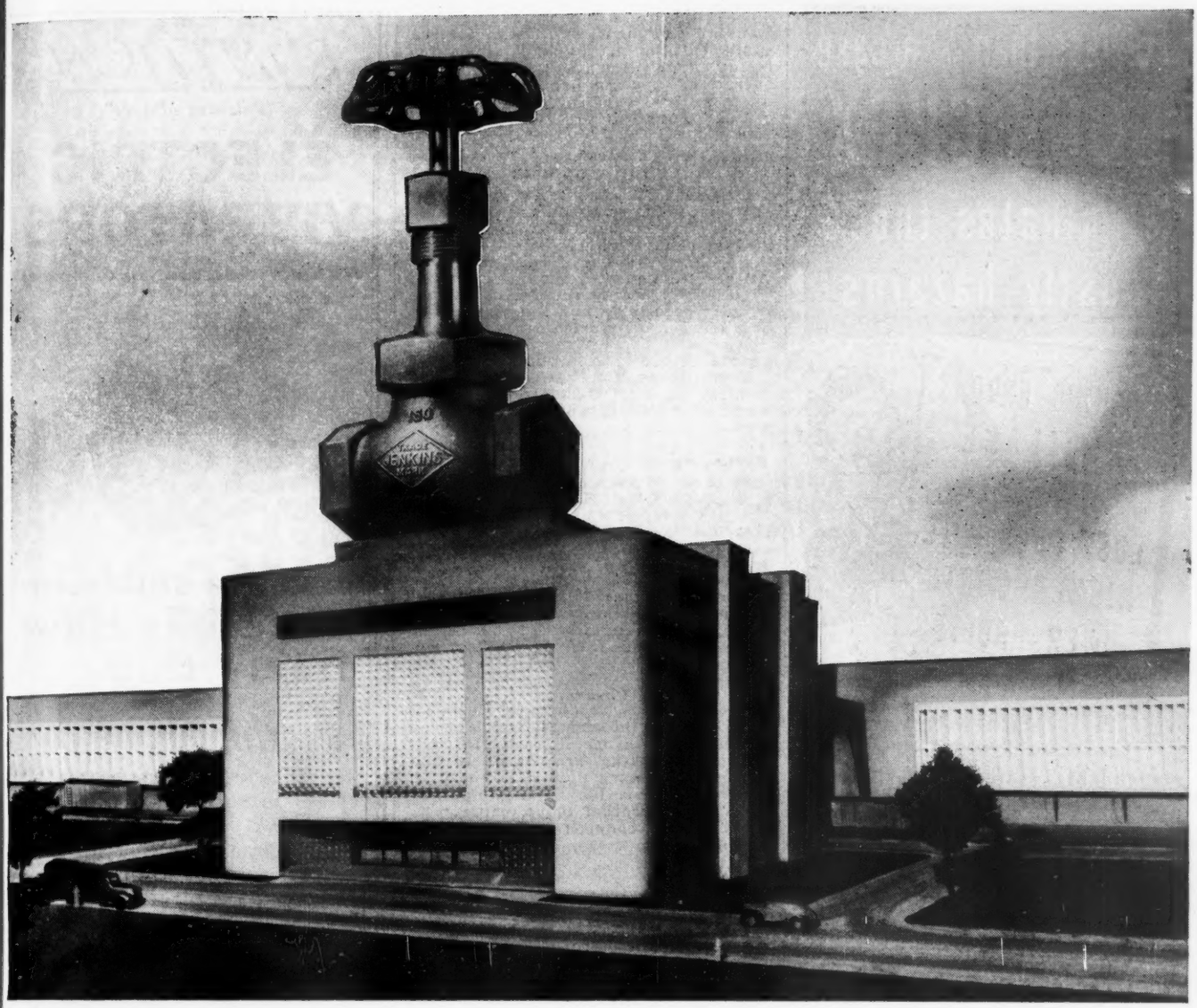
Level Indicator **86**
Fuller Co.—6-page bulletin I-3 describing Fuller material level indicator for storage bins and silos. Contains construction and application drawings.

Relief Valves **87**
Farris Engineering Corp. — 6-page illustrated bulletin, No. 50, on selection of relief or safety valves.

Current Resistors **88**
Ward Leonard Electric Co.—8-page bulletin No. 35 pertaining to three forms of high current resistors known as Edgeohm, Barohm and Loopohm.

Spectrophotometer **89**
Burrell Technical Supply Co.—8-page bulletin B-211 "Coleman Junior Spectrophotometer with the New Interchangeable Scales."

Control Equipment **90**
Hays Mfg. Co.—Three 4-page folders describing the "Straitflo" strainer, the "Measurflo" control, and the "Electroflo" valve, new products which have



There's Truth in this "Tall Story"

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The F. H. Lawson Co.—Single-page circular describing and illustrating the new Lawson all-service can.

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Ever Ready Label Corp. — 32-page catalog, "Tools of Business," a complete stock label catalog and valuable reference.

Packaging **94**
St. Regis Paper Co.—No. 17 in the series of "Case Histories"—"How a Better Container Cut Packaging Costs 58%."

Rubber Footwear **95**
The B. F. Goodrich Co.—New catalog section on its line of industrial rubber footwear. Describes construction of boots, rubbers, gaiters, work shoes and pacs and outlines their particular functions in industry.

Wet Strength Papers..... **96**
The Resinous Products & Chemical Co.—16-page informative booklet on the subject of synthetic resins in modern paper-making procedure. It discusses the history of wet strength in paper and its value in such applications as waterproof maps, paper towels, bags for chopped ice, moist fruit or vegetables, frozen foods and bottled beverages.

Miscellaneous

Baking With Dry Milk..... **97**
Complete information about milk and its uses in the bakery is contained in a new 108-page bulletin No. 100 issued by the American Dry Milk Institute, Inc. Included are sections devoted to definition, grade and composition of milks, methods of manufacture of concentrated milk products, nutritive value of nonfat milk solids, milk equivalents, storage of milk products, use of milk in bakery products, mixing, fermentation, make-up and baking of doughs containing milk solids, cost of using milk solids in bread and a few basic formulas for common fermented baked items in which milk solids are an ingredient.

Protective Coatings **98**
Lithgow Corp.—New 8-page brochure on protective coating and lining for steel and other metals. Describes a wide range of Lithcote applications. Reports of actual laboratory tests are also included.

Continuous Blowoff Systems..... **99**
Cochrane Corp.—New 16-page publication 4410 describing five different flash-tank and heat-exchanger systems for recovering the otherwise wasted heat in boiler blow-off water.

Steel Sash Catalog.....**100**
Hope's Windows, Inc.—New 32-page Lok'd Bar steel sash catalog illustrating design and construction features. Dimensions and physical data are shown by full scale diagrams. Also included is a page of suggested layouts for bays; 2 pages of photographs and diagrams of steel sash for interior partitions and a page on security windows.

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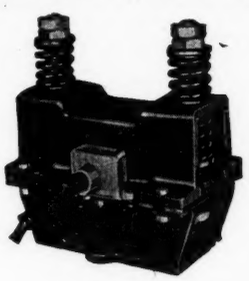

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FOOD TECHNOLOGY
NEW DISCOVERIES AND INVENTIONS

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DEHYDRATION

Dehydrating Foodstuffs

INERT gases like carbon dioxide are more desirable than air for dehydrating foods because they prevent oxidation and minimize loss of vitamins. A process for the use of such gases has recently been patented. In general, the process comprises heating carbon dioxide, for example, to the temperature for effective dehydration, passing the gas in direct contact with the foodstuff, thereafter purifying the gas by scrubbing and returning it to the dehydrating process. A steam boiler serves the dual purpose of heating the dehydrating gas, and producing flue gases that can be purified to yield carbon dioxide for the process.

Gas containing from 30-100 percent by volume of carbon dioxide is blown into the dehydrator at a positive pressure of ½ to 1 in. water pressure. Drying temperature can be maintained from 15-50 deg. F. higher than with air, with proportionate reduction in drying time and smaller volume of gas to be handled. After the gas leaves the dehydrator it is scrubbed successively with water and with an oxidizing solution, such as sodium bichromate, for deodorizing purposes. It is then dried with calcium chloride or other hygroscopic solution and returned to the dehydrator system.

Digest from U. S. Patent 2,427,302, issued September 9, 1947, on an application dated August 26, 1943, to Gustave T. Reich, Philadelphia, Pa.

BAKING

Bread Improver

SUBSTITUTION of ammonium sulphate for ammonium chloride in a chlorite bread improver is the crux of a recently issued patent, which is claimed to be an improvement on patent No. 2,365,534. Both processes embody the use of sodium, potassium, ammonium, or calcium salts of chlorous acid, thoroughly incorporated in an edible filler having a moisture content of not more than 9 percent. But the earlier process adds ammonium chloride to stimulate yeast growth, whereas the later one substitutes ammonium sulphate, claiming that the latter greatly improves the stability of the bread improver. Typical of the improved formula is the following in percent by weight: sodium chlorite, 0.25; ammonium sulphate, 12.10; calcium sulphate, 25.00; sodium chloride, 25.00; cornstarch filler, 37.65. Such a product may be used by the baker to the extent of ½ lb. to 100 lb. of flour. Storage and exposure tests of the ammonium chloride and ammonium sulphate improvers showed greater reduction of the sodium chlorite content in the former than in the latter.

Digest from U. S. Patent 2,426,736, issued September 2, 1947, on an application dated February 16, 1944, to W. S. Hutchinson, St. Paul, and R. I. Derby, Minneapolis, Minn., and assigned to Mathieson Alkali Works, Inc., New York, N. Y.

MEATS

Beef Frozen Forty Years

OPPORTUNITY was afforded recently to investigate the quality characteristics of beef hams that had been in freezer storage for 40 yr. in hermetically sealed tin cans, first at 10-15 deg. F., later at 10 and still later at zero. Some of the cans had been perforated by rust or otherwise broken, and the contents showed varying amounts of desiccation in direct relationship to the amount of exposure. A ham in an undamaged can showed about 1/16 in. freezer-burned tissue.

Compared with fresh frozen hams, the 40-yr. storage beef was more susceptible to drip. Microscopic examination of both showed similar appearance of muscle fiber and fat cells. Bacteriological tests showed that the contents of a perfectly sealed tin of stored frozen beef was sterile. Palatability comparison of cooked steaks from fresh and frozen storage beef by experienced meat judges showed no consistent preference except in flavor. In over-all preference, fresh frozen steaks received 20 votes, storage steaks 10, "no preference" eight. In nutritive tests on rats, gain in weight was about the same for groups fed on fresh- and storage-frozen beef. No apparent loss of vitamins had been sustained after 40 years' storage. Fat on the stored beef was rancid, but no deterioration had occurred in the lean meat, as indicated by the nitrogen fractions. Values for pH were typical of beef in good condition.

Digest from "The Effect of 40 Years' Frozen Storage on the Quality of Beef," by J. M. Ramsbottom, E. J. Strandine, L. B. Jensen, E. E. Rice, and H. B. Lockhart, *Refrigerating Engineering*, vol. 54, 544-549, December, 1947.

FATS and OILS

New Fat-Oil Antioxidant

CONIDENDRIN is a natural polyphenol occurring in coniferous woods, and can be recovered from sulphite waste liquor produced in pulping hemlock. Norconidendrin is a new antioxidant for fats and oils, prepared by treating conidendrin with hydrobromic acid in acetic acid solution. When added in 0.05 percent concentration to hydrogenated cottonseed, peanut, and antioxidant-free peanut oils having AOM values of 160, 15, and 3 hours, respectively, norconidendrin increased these values to 600, 57, and 50 hours. Added in concentrations of 0.001 to 0.10 percent to refined cottonseed and peanut oils and an antioxidant-free peanut oil, the antioxidant activity of norconidendrin increased with increased concentration. Other tests showed that the new antioxidant can be added

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with equal effectiveness before or after deodorization; that it has approximately the same antioxidant activity as NDGA in lard; and that its effectiveness is appreciably enhanced by the addition of acid-type synergists. Toxicity studies have not yet been made.

Digest from "Norconidendrin: A New Antioxidant for Fats and Oils," by G. S. Fisher, L. Kyame and W. G. Bickford, *Journal of the American Oil Chemists' Society*, vol. 24, 340-43, October, 1947.

CONFECTIONERY

Vapor Pressure Affects Confection Keeping Quality

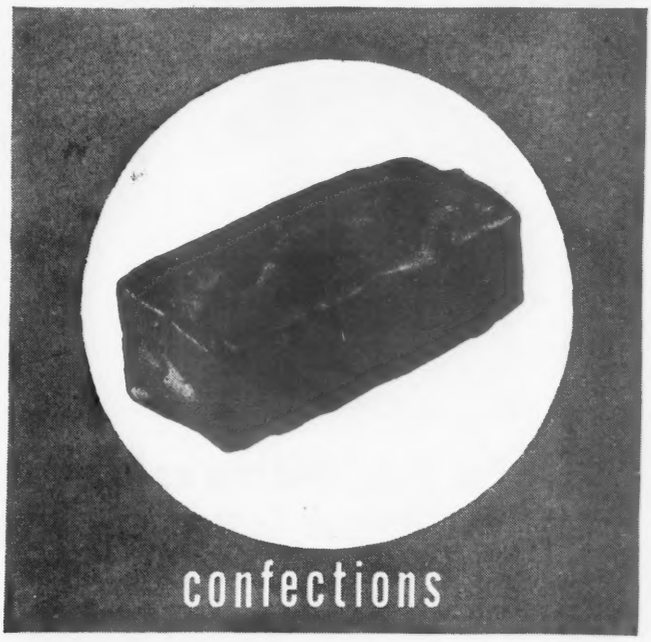
FOODS rich in sugar or soluble solids have a moisture vapor pressure depending on the formula by which they have been made and from which their relative vapor pressure may be calculated. Relative vapor pressure is numerically the same as the relative humidity percentage of the atmosphere around the candies. It is calculated from a simple equation in which empirical constants, obtained by direct measurements on the materials used, are applied to the quantities of the materials in the candy formula. Results of the calculations agree well with direct measurements on such products as jams, fruit jellies, Turkish delight, marshmallow, toffee, hard candies, fondants, marzipan and cream paste. Chocolate, being essentially finely ground sucrose suspended in solid cocoa butter, does not absorb moisture appreciably up to about 85 percent relative humidity.

The calculations indicate relative vapor pressures for confectionery of 20-80 percent; therefore, under indoor humidities of 50-90 percent, gains or losses are likely to occur. Jams, jellies and other soft confectionery are likely to dry out, while hard candies and toffies will absorb moisture and become sticky. Hard candies also "grain" in a humid atmosphere owing to absorption of sufficient moisture to permit change on the surface from supersaturation to saturation and crystallization. Such candies show an increase in relative vapor pressure as graining increases. Spoilage by yeasts and molds does not ordinarily take place on goods of less than 65 percent relative vapor pressure.

Relative vapor pressures may be lowered by formula modifications. If the goods do not contain crystalline sucrose, water content may be reduced, sucrose or confectioners glucose may be replaced with invert

(*Continued on page* 204)

better flavors with ETHAVAN



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Manufacturers who would like additional information and technical data on Ethavan are invited to mail the coupon — or contact the Monsanto District Sales Office in your area. Inquire also about the many applications of Methyl Salicylate, U. S. P., Benzyl Benzoate, U. S. P., Vanillin and Coumarin Monsanto.

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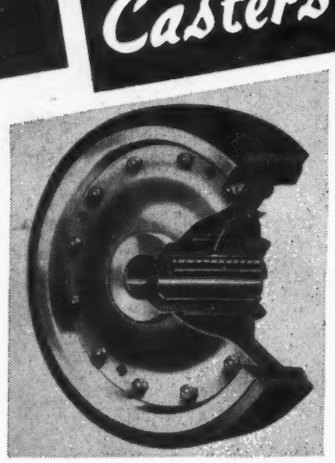

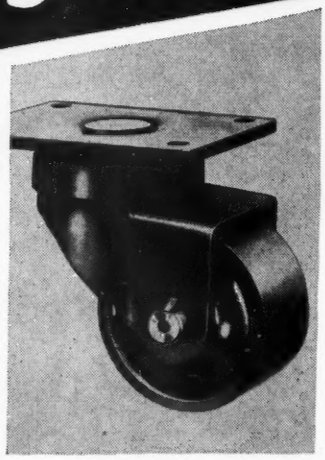

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sugar, or a humectant such as glycerin may be added. If crystalline sucrose is present, invert sugar may be used to replace confectioners glucose, a humectant may be used, or the ratio of non-sucrose soluble solids to water may be increased. Such formula alterations may, of course, result in other effects on quality of finished goods.

Digest from "The Keeping Properties of Confectionery as Influenced by Its Water Vapor Pressure," by D. W. Grover, *Journal of the Society of Chemical Industry*, vol. 66, 201-205, July, 1947.

MICROBIOLOGY

Salmonella in Dried Egg

SALMONELLA organisms are found in dried egg products often enough to cause concern, and their origin and manner of access have been investigated on products from many types of plants. Salmonella was found in 112 of 400 samples examined from Canadian plants. Each sample was a composite of a carload of egg powder.

Geographically there was no significant distribution of infected samples, though the percentage was higher from western plants. Nor was there any relation between type of drier and incidence of organisms. More infected lots were found in the fall and winter months than in the summer. Distribution of organisms in the powder is spotty and in most powders less than one organism per gram is present. It was not unusual to obtain negative results for a small sample and positive for a larger sample of the same egg powder. Whether a plant used fresh eggs or frozen mixed egg made little difference.

Fifteen types of Salmonella were found, *S. oranienburg* occurring most frequently, followed by *S. typhimurium* and *S. pullorum*. While fecal contamination of egg shells is usually considered to be the source of Salmonella organisms, eggs from various parts of Canada were examined, with positive results for *S. pullorum* in only a few examinations of eggs and egg shells. Isolations have been made from the eggs of flocks known to be infected, and Salmonella may be recovered from commercial eggs if large enough samples are taken, but there is still insufficient evidence to say that infection arises only from fecal contamination.

Digest from "Dried Whole Egg Powder. XXVII. Further Observations on the Occurrence of Salmonella Organisms in Canadian Powder," by N. E. Gibbons, *Canadian Journal of Research*, vol. 25, Sec. F. 291-8, September, 1947.

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PORTABLE A.C. OPERATION! The Beckman Model H instrument can be quickly moved from one part of the plant to another and plugs directly into standard 110 v. 50/60 cycle A.C. current. Compact, convenient and extremely simple to operate, the Model H gives instant pH readings on an easily-read dial. It is widely used both for manual pH control of small plants and as an auxiliary instrument on completely automatic pH installations.

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DAIRY

Changes in Cheese Fat

CHANGES in the fat constants of cheese fat during the ripening of Cheddar cheese have been investigated to determine the relationship of those changes to flavor. Factors studied were: Pasteurization of the milk, homogenization of the milk, and addition of organic acids to the milk and cheese curd.

The effect of pasteurization was studied on 4 lots of cheese, 2 from raw and 2 from pasteurized milk. The results showed that pasteurization reduced the hydrolysis of fat in the cheese. Hydrolysis was greatest in a lot made from raw milk, which also had the most pleasing flavor at 9 months.

Homogenization of milk at 300 lb. exerted no detrimental effect on the cheese body, but at 800 lb. it produced a weak pasty body at 9 months.

Addition of organic acids accelerated hydrolysis of cheese fat. Proprionic, glacial acetic, and citric acids, and starter distillate were added alone or in combination to milk or curd. Acetic and propionic acids produced undesirable flavors, and citric acid and starter distillate the highest flavor score at the end of the ripening period.

Digest from "A Study of the Changes Occurring in the Fat Constants of Milk Fat of Cheddar Cheese During the Ripening Process," by J. J. Sheuring and S. L. Tuckey, *Journal of Dairy Science*, vol. 30, 803-816, November, 1947.

FREEZING

Ice Crystal Formation In Frozen Foods

EXAMINING frozen foods with the petrographic microscope, and using the methods of the mineralogist in preparing and analyzing thin sections, has thrown new light on ice crystal formation in frozen food products. The usual procedure in preparing thin sections of organic materials is to imbed the specimens in paraffin, and section them with a microtome. Mineral specimens, on the other hand, are first cemented to the slide and then reduced to the desired thinness by appropriate means. It is believed that the microtome method alters the ice crystal structure of frozen food products, and hence gives inaccurate information when the specimen is examined under the ordinary microscope. The mineralogist's method of shaving the specimen down to the desired thinness while it is at-

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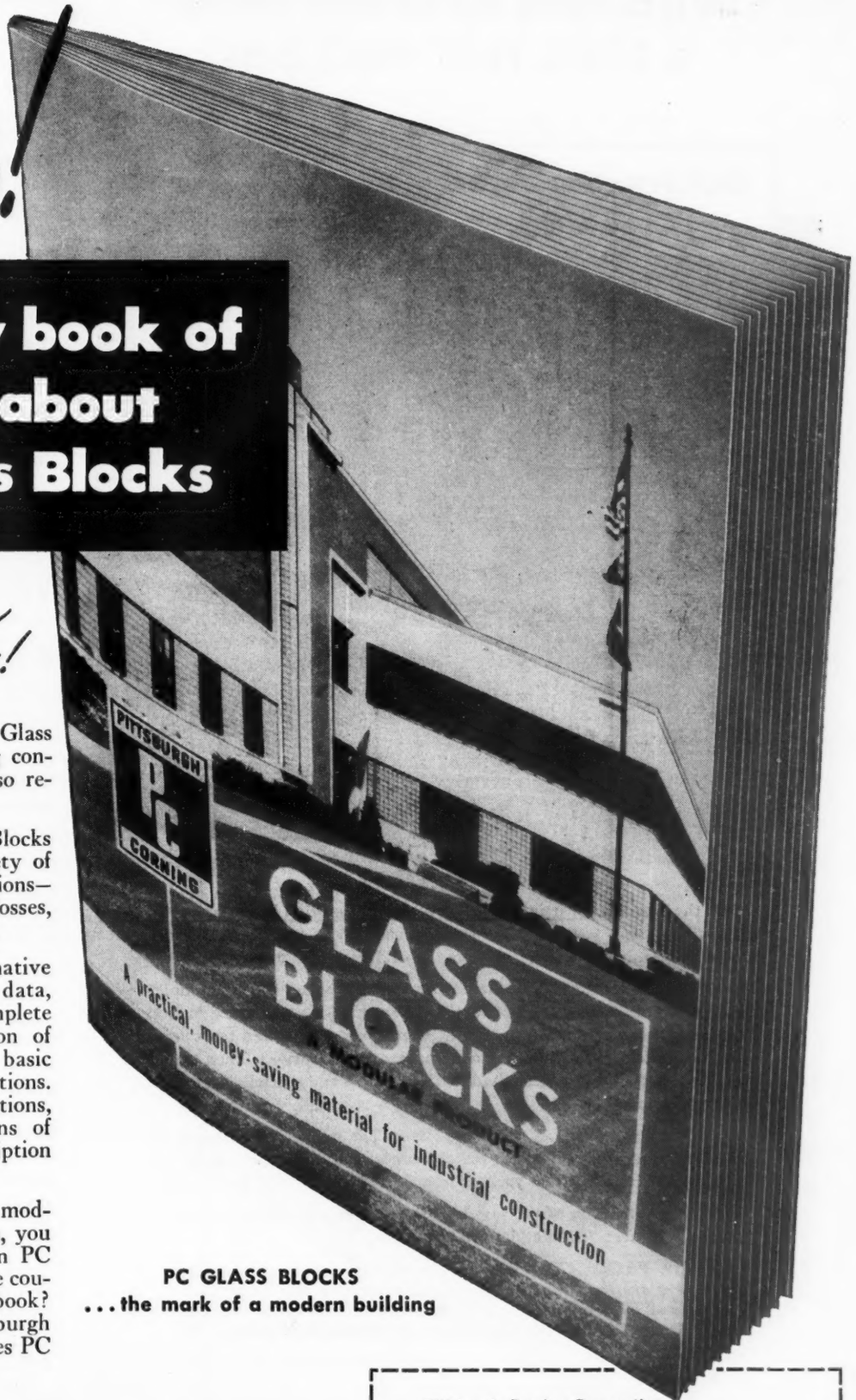

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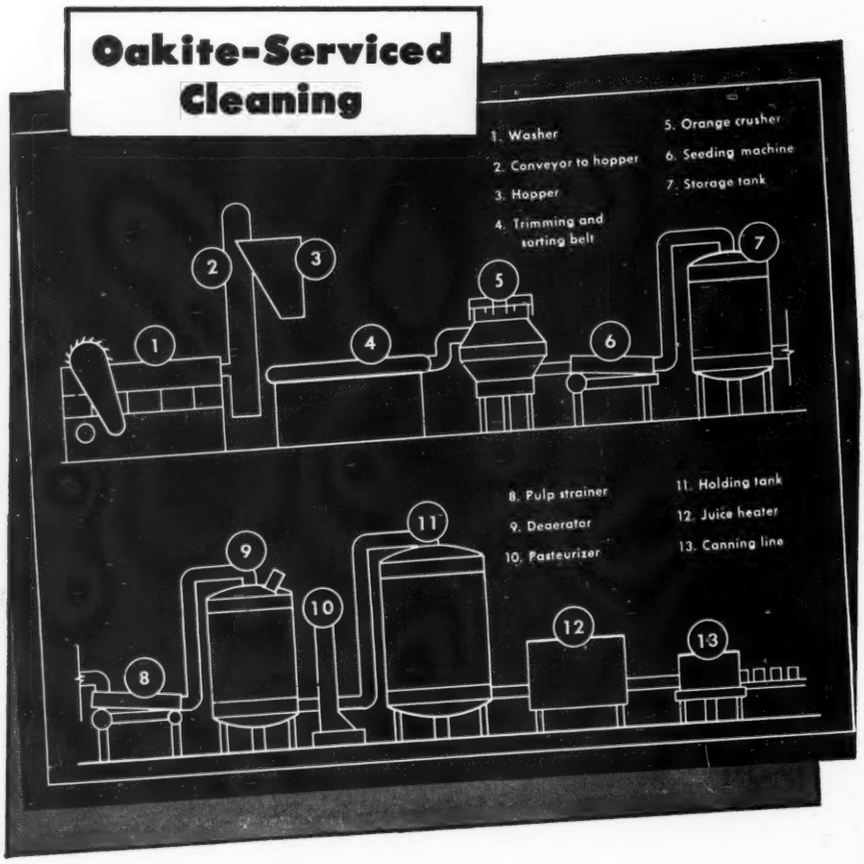

Here's the flow line for a citrus fruit processing operation in the plant of a nationally known packer. Sanitation in this plant was a troublesome problem. Cleaning procedures were costly and time-consuming.

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tached to the slide, and then examining it under a polarizing microscope should give a truer picture of conditions and perhaps help evolve an acceptable theory of food damage by freezing.

Frozen shrimp specimens, thus prepared and examined, revealed intercellular ice crystals much larger than any cell, with no tendency to rupture cell walls. Frozen beets showed large ice crystals containing numerous unharmed cells. Peaches and apples showed numerous crystals both larger and smaller than individual cells. The method gives a positive analysis of ice crystals in frozen foods, and offers a procedure for determining crystal areas and differentiating unfrozen portions.

Digest from "The Petrographic Microscope Presents a New Freezing Concept," by J. M. Lebeaux, *Refrigerating Engineering*, vol. 54, 531-533, December, 1947.

VITAMINS

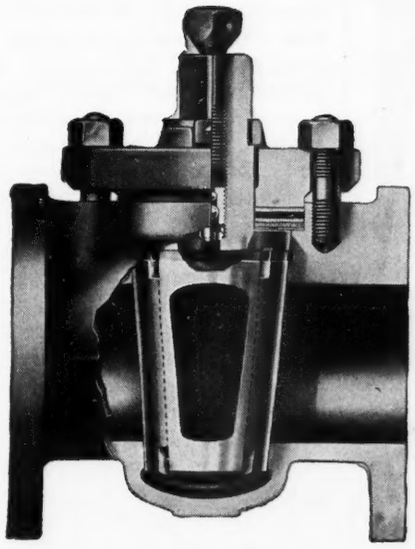
Retention of Vitamins

PORK luncheon meat in vacuum-sealed cans has been studied to determine the thermal stability of thiamin, riboflavin, niacin and pantothenic acid, the survival of these vitamins during heat processing, and their retention during storage.

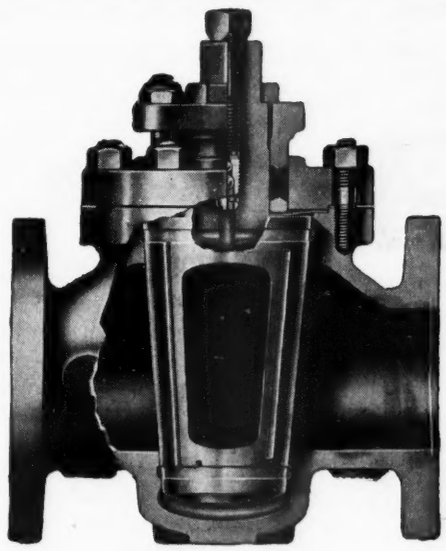
Heating to 230 deg. F. for 273 min. or to 245 deg. F. for 193 min. permitted riboflavin and niacin retentions of about 90 percent. Pantothenic acid, however, was distinctly less stable, and its rate of destruction increased with the temperature. The rate of thiamin destruction also increased with rising temperature—an 18 deg. F. rise in temperature doubling the rate of thiamin destruction. But with a similar increase in temperature, the increase in rate of bacterial spore destruction was 5 times greater than the increase in thiamin destruction. Evidently, under conditions of rapid and uniform heating of the entire mass, thermal processing at the higher temperature should be more favorable to thiamin retention.

Tests conducted in commercial size cans showed retentions of riboflavin and niacin to the extent of 70-95 percent, and of pantothenic acid of 60-75 percent. The retention of thiamin was least satisfactory. A larger percentage was retained in a 12-oz. can than those containing 2.5 and 6 lb.

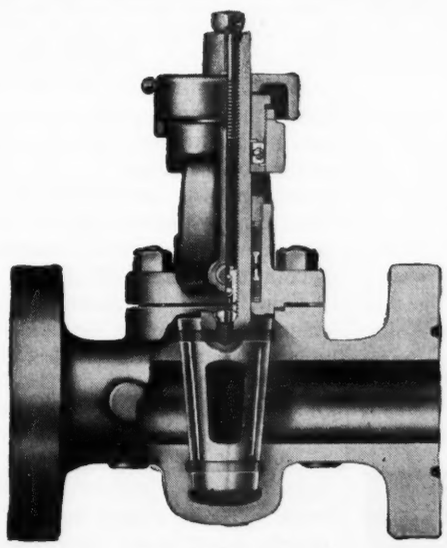
The "core effect" was studied on large cans by taking samples from



Single Gland Type



Regular Gland Type



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the outside, intermediate and center positions. Thiamin content increased rapidly in successive samples from outside to center of the loaf, ranging from 40-70 percent, respectively, with an average retention of 52 percent. Pantothenic acid showed a less marked core effect, and riboflavin and niacin a slight graduation in retention from outside to center.

Study of the effects of storage time and temperature after various heat treatments showed that the sacrifice of thiamin is continuous in the range of 70-98 deg. F., and that the product should be kept a minimum period of time at 70 deg. F. or above. Retention of the other three vitamins was little affected by temperature. The general conclusion was that pork luncheon meat destined for long storage periods should be kept below 70 deg. F. if a product of good quality and thiamin content is to be obtained.

Digest from "Heat Processed Pork Luncheon Meat Shows Good Retention of B Vitamins," by J. F. Feaster, *Food in Canada*, vol. 7, 30-34, October-November, 1947.

FERMENTATION

Wort Fermentation

INFLUENCE of wort constituents on rate of fermentation by brewers' yeast has been studied in a synthetic medium physiologically similar to beer wort. Rate of fermentation in the synthetic medium was compared with that in beer wort. When a close approach of the former to the latter was found, individual components of the synthetic medium were singly omitted to determine effect of their absence on fermentation rate. The provisional synthetic medium contained NH_4Cl, NaH_2PO_4, KCl, $MgSO_4 \cdot 7H_2O$, sucrose, thiamin chloride, pyridoxine hydrochloride, niacin and citric acid. Calcium was added in certain ratio to magnesium, and organic nitrogen was incorporated. After preliminary experiments, dextrose was selected in place of sucrose, and succinate in place of citrate buffer.

Omitting components singly from fermentation tests, the most noticeable reductions of gas evolution were produced by the absence of NH_4, PO_4, Mg, SO_4, and K. Omission of vitamins was without marked effect. Sodium and chloride ions also were without effect at the ionic concentrations used. Calcium in the absence of magnesium had little effect, but maximal effect when both were present in equal

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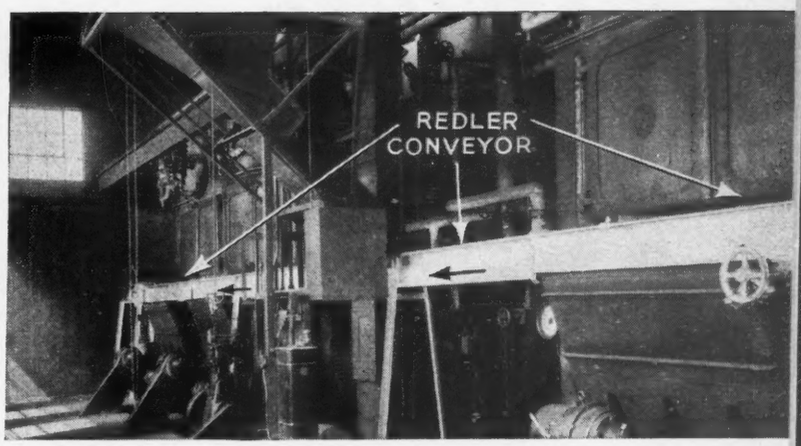

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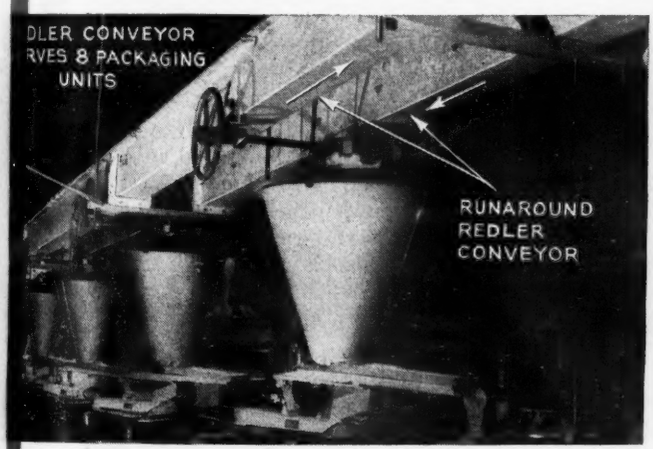
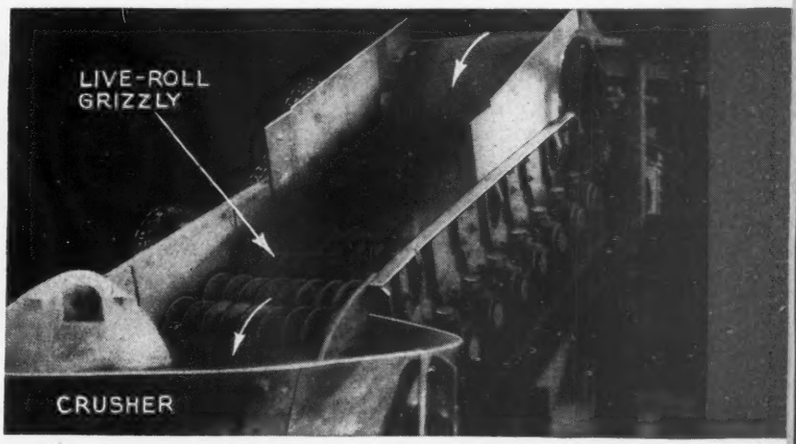


When absolute cleanliness without disturbance of balance of mixed ingredients is needed, S-A REDLER Conveyor-elevator Systems get the call. The system shown here conveys food ingredients, distributes the mixture to battery of packaging machines. Sealed casings prevent contamination, eliminate waste from spillage. S-A engineered REDLER Systems are in wide use in the food processing and chemical fields . . . can be engineered to meet virtually any bulk material handling problem.



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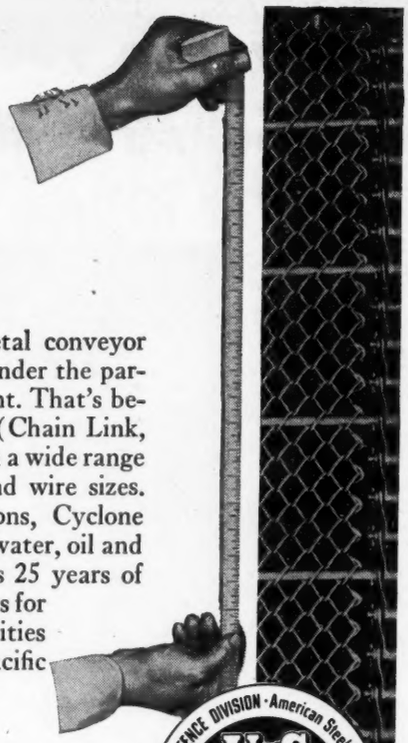

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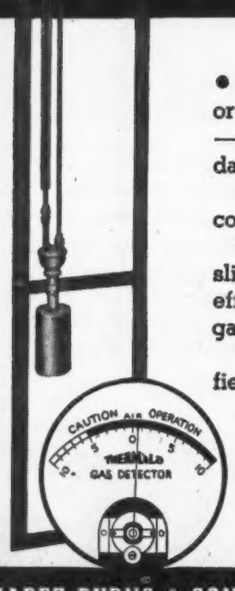

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concentrations. Amino acid nitrogen and yeast extract caused increased gas production.

Digest from "Influence of Wort Constituents on the Rate of Fermentation by Brewers' Yeast," by L. Atkin and P. P. Gray, Proceedings of the American Society of Brewing Chemists, 69-81, May, 1947.

MISCELLANEOUS

Fruit-Flavored Sugars

ACCORDING to a recent patent the objectionable taste of raw cane sugar can be converted to a palatable fruity taste, although the product is devoid of the essential oils responsible for natural fruit flavors. The raw sugar thus treated can be formed into a solid brick or bar in which no further inversion takes place, and in which the flavor is stabilized.

Raw cane sugar containing 0.35-1.5 percent ash is dissolved in water to a concentration of 40-70 Brix. It is then acidified with ½ the total acid required to produce a pH of 2.5-3.6 and heated under pressure to a temperature of 260-290 deg. F. for 10 min. Concentration is continued to 85-95 Brix at which point the remainder of the acid is added. The solution is then filtered through a non-decolorizing agent such as diatomaceous earth. A small quantity of pectin is mixed into the solution before it is poured into molds to solidify. The type of fruit flavor may be controlled by the ash content of the raw cane sugar. The finished solid mass will contain not less than 60 percent sucrose and preferably more than 80 percent.

Digest from U. S. Patent 2,429,251, issued October 21, 1947, on an application dated August 12, 1943, to A. M. Zenzes, New York, N. Y.

Preserving Eggs

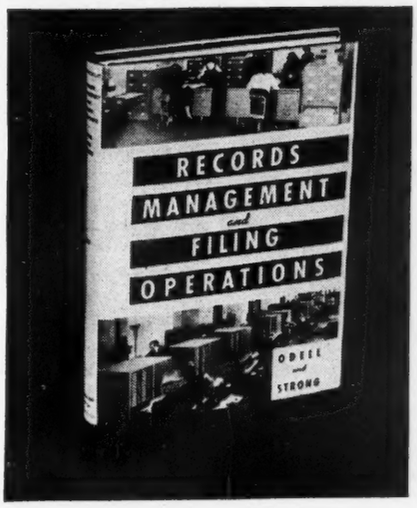
STERILIZATION by heat is the crux of a patented process for preserving eggs for edible consumption. The patentee states that when eggs of domestic poultry are subjected to temperatures from 110 to 145 deg. F. for short periods of time, embryonic development is prevented without sacrificing edible quality. Death of microorganisms also results from the heat treatment, which does not affect firmness and stability of the albumen or deteriorate the inherent whipping quality of the eggs.

Digest from U. S. Patent 2,423,233, issued July 1, 1947, on an application dated August 20, 1942, to Ernest M. Funk, Columbia, Mo.

BOOKS

Front Office

RECORDS MANAGEMENT AND FILING OPERATIONS. By Margaret K. Odell and Earl P. Strong. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y., 1947. 342 pages; 6¼x9¼ in.; cloth. Price, $4.



Here is a book that could be of particular help to the small food plant operator. He always intends to find the way to organize his filing system, but seldom gets around to it. The book's authors know most of the difficulties to be found in present day office procedure. They know some of the personnel difficulties, too. They are able, therefore, to provide answers for many of the vexing problems that add up to inefficiency and irritation.

Dried Eggs

THE BACTERIOLOGY OF SPRAY-DRIED EGG. Special Report, the British Medical Research Council. Published by His Majesty's Stationery Office, London, England. 66 pages; 6x9¾ in.; paper. For sale at British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. Price, 35 cents.

When American spray-dried egg powder became a factor in England's mid-war food program, little was known about the product's bacterial content. The frequency of Salmonella infections among U. S. poultry prompted a British investigation of the powder.

The results are presented in this booklet. It also explains why the powder continued in use even though Salmonella was frequently found. The study should interest members of the poultry industry in general and producers of eggs and egg products in particular.

Fermentation

ADVANCES IN ENZYMOLOGY, Vol. VII. Edited by F. F. Nord. Published by Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y., 1947. 665 pages; 6½ x 9½ in., cloth. Price, $8.75.

This is another volume adding to the critical reports in the field of enzymology, competently edited. Some 60 pages of the volume are devoted to industrial fermentation. Here the butanol-acetone, ethyl alcohol and butylene glycol fermentations are discussed. Other helpful discussions are those on antibacterial substances from fungi and green plants, the interrelations in microorganisms between growth and metabolism of vitaminlike substances, and some applications of radio-active indicators in turnover studies.

Sweet Book

THE TASTE SENSE AND THE RELATIVE SWEETNESS OF SUGARS AND OTHER SWEET SUBSTANCES. By A. T. Cameron. Published by Sugar Research Foundation, Inc., 52 Wall St., New York 5, N. Y., 1947. 72 pages; 6x9 in.; paper. Free.

The study follows the pattern of its title, except that it is neither long nor cumbersome. The second portion, dealing with the relative sweetness of sugars, will be of direct interest to food processors.

Figures illustrating the many aspects of taste relationship between the various sugars, and tables simplifying the data are used extensively.

This monograph is Report No. 9 in the Foundation's scientific series. While it was published after the author's death, last September, he had an opportunity to see and approve the final proofs.

Booklets

AMERICAN MANAGEMENT ASSOCIATION SERIES. Published by the Association, 330 W. 42nd St., New York 18, N. Y. Under separate paper covers 6x9 in.

Because the titles describe the contents, they are listed here, along with number and price, without comment:

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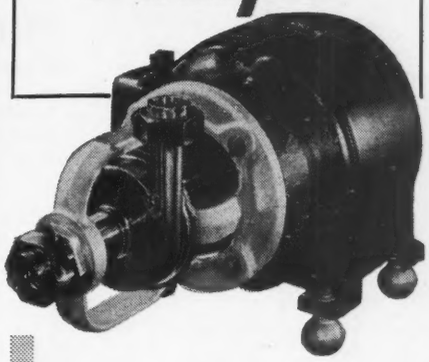

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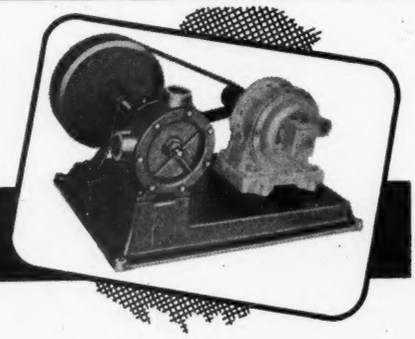

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Production Policies for Increased Output. PS No. 169. Price, 75 cents.

The Human Aspects of Methods Improvement. PS No. 170. Price, $1.

GOVERNMENT PUBLICATIONS

The following recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the Bureau responsible for its issue.

WASTE AND SPOILAGE LOSSES IN MERCHANDISING FRESH FRUITS AND VEGETABLES IN BULK IN SELF-SERVICE FOOD STORES. By Donald R. Stokes. Bureau of Agricultural Economics, U. S. Department of Agriculture, Unnumbered, processed. Accompanied by statistical supplement of the same title. A cooperative study made with American Stores Company, Philadelphia.

PEANUT PROTEIN FIBER: ITS POSITION IN THE PROTEIN FIBER WORLD. By Walter M. Scott. Bureau of Agricultural and Industrial Chemistry, AIC-165. Mimeographed. Summary of present status and economic prospects as judged by Southern Regional Research Laboratory.

UNIDENTIFIED NUTRIENTS IN MILK. By C. A. Cary and A. M. Hartman. Bureau of Dairy Industry, BDIM-Inf-53. Processed.

THE EFFECT OF FOREWARMING ON THE VISCOSITY OF SWEETENED CONDENSED MILK. Bureau of Dairy Industry, BDIM-Inf-47a. Processed. A supplement.

DAIRY AND POULTRY MARKET STATISTICS, 1946. Production and Marketing Administration, CS-23. Processed.

DETERGENTS AND DETERGENT AIDS. National Bureau of Standards, Letter Circular LC868. Mimeographed.

LIST OF COMMERCIAL STANDARDS. National Bureau of Standards, Letter Circular LC878. Mimeographed. List revised to October 1, 1947 of recommended commercial standards.

PATENTS

Bread Slices Re-sliced to One-Half Thickness—Miner L. Hartmann, Beverly Hills, Calif. No. 2,429,756. Oct. 28, 1947.

Root Vegetables and Fruits Peeled by Steaming in Plurality of Tubular Chambers Under Controlled Pressure Followed by Release of Pressure Through Condensation of Steam to Form Vacuum and Explode Skin—Russell H. Winters to The Larsen Co., Green Bay, Wis. No. 2,429,785. Oct. 28, 1947.

Shrimps Peeled by Mechanical Action of Oscillating Rollers—Fernand S. Lapeyre, New Orleans, and James Martial Lapeyre III, Houma, La. No. 2,429,838. Oct. 28, 1947.

Non-Alcoholic Vanilla Flavoring Solution Made to Be Stable Under Refrigeration and to Retain Brown Caramel-Like Color After Standing—Frederick J. Zimmermann and Maurice Kayner, Wausau, Wis., to Salvo Chemical Corp., Rothschild, Wis. No. 2,429,907. Oct. 28, 1947.

Defrosting of Liquid Foods Speeded Up by Grinding into Snow Form to Increase Bulk and Expose Surface Area—George Dudley Allman, Chicago, Ill., to United States Cold Storage Corp., Wilmington, Del. No. 2,429,909. Oct. 28, 1947.

Unstemmed Fruit Mechanically Positioned and Fed to Fruit Treating Machine Stem Up—Burton C. Coons to Food Machinery Corp., San Jose, Calif. No. 2,429,991. Nov. 4, 1947.

Hard Wax Extracted Directly from Sugar Cane Mud—Werner F. Goepfert, Short Hills, N. J., to Interchemical Corp., New York, N. Y. No. 2,430,012. Nov. 4, 1947.

Sugar Solutions Decolorized by Action of Chlorite in Presence of Elemental Chlorine—George P. Vincent, Briarcliff Manor, N. Y., to Mathieson Alkali Works, Inc., New York, N. Y. No. 2,430,-262. Nov. 4, 1947.

Oil-Bearing Vegetable Seeds or Nuts Mechanically Pressed to Remove Part of Oil Content Soft Porous Press Cake Ground to Desired Granulation for Solvent Extraction—Edward W. Schmidt, St. Paul, and William F. Webber to Archer-Daniels-Midland Co., Minneapolis, Minn. No. 2,430,535. Nov. 11, 1947.

Sugar Made to Have Soya Lecithin Content without Loss of Dry, Free-Flowing Properties—Frank E. Bigelow, Hillsboro, Ill. No. 2,430,553. Nov. 11, 1947.

Fatty Oils Extracted for Recovery of Antioxidant to Stabilize Natural or Synthetic Rubber—Loran O. Buxton, Maplewood, N. J., to Nopco Chemical Co., Harrison, N. J. No. 2,430,556. Nov. 11, 1947.

Shortening Made to Have Extended Plastic Range for All-Climate Use—Norbert W. Ziels, Leonia and Werner H. Schmidt, Grantwood, N. J., to Lever Brothers Co., Cambridge, Mass. No. 2,430,596. Nov. 11, 1947.

Freshly Ground Roasted Coffee Packaged in Gas-Impervious Bag Containing Synthetic Resin with Anion-Exchange Properties — Abraham Sidney Behrman, Chicago, Ill. No. 2,430,663. Nov. 11, 1947.

Pork Shoulders Covered with Flavoring Ingredients, Stuffed into Natural Beef Casing, Cured and Smoked—Gustav J. Kellermann to Industrial Patents Corp., Chicago, Ill. No. 2,430,818. Nov. 11, 1947.

Freshly Skinned Beef Carcasses Cooled to 50 to 70 Deg. F. and Pressed Sufficiently to Remove Occluded Blood from Carcass Fat While in Plastic State—Beverly E. Williams to Industrial Patents Corp., Chicago, Ill. No. 2,430,849. Nov. 11, 1947.

Tartaric Acid Freed from Oxalic Acid and Ash-Forming Impurities—W. E. Barch, Freeport, N. Y., to Standard Brands, Inc., New York, N. Y. No. 2,430,-855. Nov. 18, 1947.

Fruit Flavor Developed in Raw Sugar Containing from 0.35 to 1.5 Percent Ash by Heating to Higher than 245 Deg. F. for from 5 to 30 Min. and Acidifying to pH of 2.5 to 3.6—A. M. Zenzes, New York, N. Y. No. 2,430,903. Nov. 18, 1947.

Cakes Iced by Mechanical Means—D. H. Duffy, Wichita, Kan. No. 2,431,029. Nov. 18, 1947.

Doughs for Coffee Cakes and Like Mechanically Rolled and Elongated—E. C. Palmer, Avenel, N. J., to National Biscuit Co., New York, N. Y. Nos. 2,431,073 and 2,431,074. Nov. 18, 1947.

Cashew Nut Shell Liquid Freed from Toxic Phenolic Components — R. E. Kremers, Summit, N. J., to General Foods Corp., Hoboken, N. J. No. 3,431,127. Nov. 18, 1947.

Wood Sugar Solutions Clarified and Freed from Materials Toxic to Fermentation—R. M. Boehm, Laurel, Miss., and H. E. Hall, Lyle, Tenn., to Masonite Corp., Laurel, Miss. No. 2,431,163. Nov. 18, 1947.

Continuous Bake Oven Designed to Have One Central Primary and Two Secondary Heat Receiving Chambers—T. J. Stephens, New York, N. Y., one-half to Charlotte von Glahn Seltman. No. 2,431,207. Nov. 18, 1947.

Meat-Loaf and Like Shaped in Mold Fitted with Lid under Spring Tension and Rigid Guide Studs to Telescope into Guide Cylinders at Ends of Pan and Hold Lid in Proper Alignment with Walls of Pan—F. H. Hoy to Hoy Equipment Co., Milwaukee, Wis. No. 2,431,253. Nov. 18, 1947.

(*Patents continued on page* 220)

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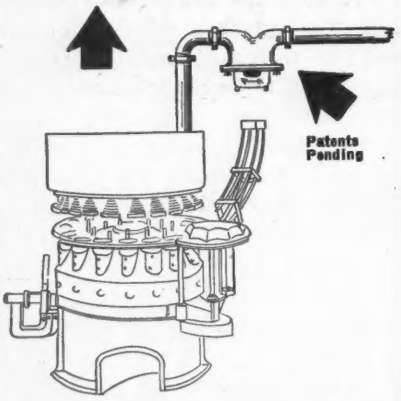

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Letters to the Editor

Storage of Chocolate

To the Editor
of FOOD INDUSTRIES

This letter is in reference to our correspondence in late 1944 and early 1945, (FOOD INDUSTRIES, p. 104, March, 1945—*Editor*), regarding critical storage temperatures for chocolate coating.

During September, 1946, we placed in storage at average temperatures of 45 deg. F. and 68 deg. F. two lots each of a fine vanilla, a cheap vanilla, a fine milk coating and a liquor. All of these lots were carefully and properly tempered. One lot of each was rushed through the cooling tunnel so that the centers of the 10-lb. cakes were so soft that a blunt instrument could penetrate. The other lots were fully cooled and were as hard on the inside as on the outside. They were all packaged in paper bags, five cakes to a corrugated case, and stored in the usual manner.

A case of each lot was examined for granulation and melting qualities at the end of six, nine and twelve months. Results are shown in the table below.

GRANULATION of Chocolate Coatings After Storage at 68 Deg. F.

Coating	Milk		Fine Vanilla		Cheap Vanilla		Liquor	
Fat Content, Percent	34.6		35.9		35.2		54.0	
Center	hard	soft	hard	soft	hard	soft	hard	soft
Granulation at 68 Deg. F.								
6 mon.	none	none	none	none	none	slight	none	slight
9 mon.	none	none	none	very slight	none	slight	none	slight
12 mon.	none	none	none	very slight	none	slight	none	slight

Although not shown in the table, the results at 45 deg. F. storage were the same as at 68 deg. F. except that the cheap vanilla showed no granulation at the end of six months and was the same as the 68 deg. F. lot at nine and twelve months. None of the granulation was sufficient to affect the melting properties of the coatings.

From these results we conclude that 68 deg. F. is not a critical storage temperature for chocolate coating, provided the coating has been properly tempered and cooled during the molding operation. Also, we conclude that proper tempering followed by improper cooling may cause slight granulation at any storage temperature, except in milk coatings. This slight granulation causes no apparent difficulty in the melting of these coatings.

These results verify our previous observations that if coatings are properly tempered and properly molded, there is no critical storage temperature until the temperature reaches the middle 70's.—*R. F. Korfhage, Chief Chemist, Peter Cailler Kohler Swiss Chocolates Co., Inc.*

PATENTS

(*Continued from page* 219)

Protein Hydrolysate Made to Have Foam Stabilizing Properties — H. L. Keil, Clarendon Hills, and J. S. Ingraham, Chicago, Ill., to Armour & Co., Chicago, Ill. No. 2,431,256. Nov. 18, 1947.

Dextrins Recovered From Stillage Syrup—H. W. Coles, Rochester, N. Y., to Joseph E. Seagram & Sons, Inc., Shively, Ky. No. 2,431,309. Nov. 25, 1947.

Pears Mechanically Fed to Peeling Machine—B. C. Coons to Food Machinery Corp., San Jose, Calif. No. 2,431,310. Nov. 25, 1947.

Cottonseed Oil Stabilized Against Oxidation by Heat-Treating and Addition of 1 Percent of Phosphatide—Albert Scharf, New York, N. Y., to American Lecithin Co., Cleveland, Ohio. No. 2,431,347. Nov. 25, 1947.

Starch Suspension Freed of Gluten Content by Treatment With Potassium Salicylate and Ammonium Hydroxide—J. H. Obey, Pittsburgh, Pa., to Chemprotin Products, Trenton, Mich., Laszlo Kormendi, New York, N. Y., and B. C. Boeckeler, Grosse Ile, Mich. No. 2,431,417. Nov. 25, 1947.

Vanilla Acid Recovered From Lignin Degradation Products by Precipitation With Neutral Lead Acetate—I. A. Pearl to Sulphite Products Corp., Appleton, Wis. No. 2,431,419. Sept. 25, 1947.

Fish Mechanically Positioned Belly Down and Held for Cutting Along Back and Into Various Lengths—A. L. Christiansen, Willowbrook, Calif. No. 2,431,465. Nov. 25, 1947.

Hard Candy Mechanically Preformed During Feeding to Cutting Machine—Leo Latini, Chicago, Ill. No. 2,431,489. Nov. 25, 1947.

Coffee Powder Made From Water Extract Under Vacuum at Less Than 300 Microns Pressure—S. Natelson and M. Weiss, Brooklyn, N. Y. No. 2,431,496. Nov. 25, 1947.

Granular Shortening Made to Have Fat Center, Edible Hull and Composition of Edible Partial Ester of Glycerine and Higher Fatty Acid and Partial Ester of Sorbitol and Stearic Acid—G. C. North, A. J. Alton and L. Little, to Beatrice Creamery Co., Chicago, Ill. No. 2,431,497. Nov. 25, 1947.

Dry Powdered Shortening Made to Be Non-Greasy, Free-Flowing and Readily Water Dispersable—G. C. North, A. J. Alton and L. Little, to Beatrice Creamery Co., Chicago, Ill. No. 2,431,498. Nov. 25, 1947.

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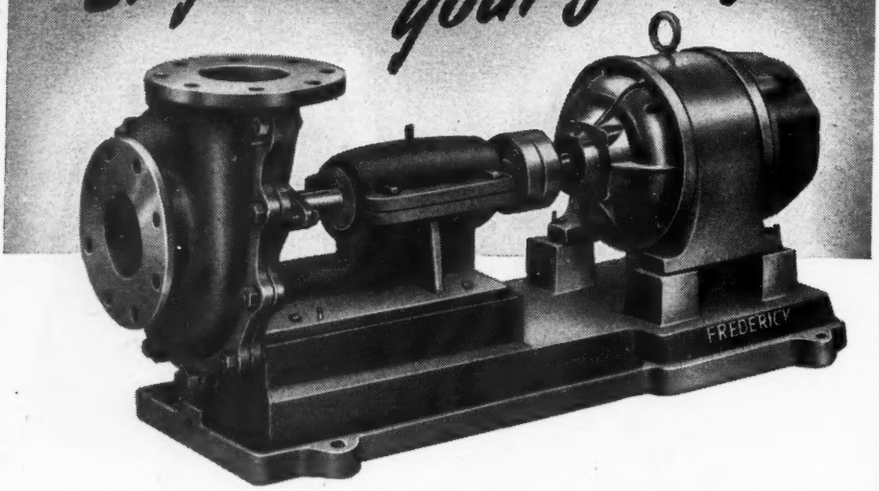

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Foreman and Enzymes

(Continued from page 71)

to make them take place with reasonable rapidity.

Everybody has heard that the human body is like a steam engine. It burns food and furnishes power. But the temperature of the body (98 deg. F.) is very different from that of the fire-box in a locomotive (2500 deg. F.). How does the body burn its food without blistering itself? Enzymatically. The enzymes provided by nature modify the burning process so that it goes on at body temperature instead of at red heat. Some of the enzymes that do this are among those that have been isolated from dead plant or animal tissues, and studied. They are proteins. How they do it is still largely a matter of guess-work, but their effects are a matter of everyday experience. Sugar, for instance, can actually be converted at body temperature to the same products (carbon dioxide and water) that are formed when sugar is burnt.

Series of Reactions

This is by way of illustration that enzymes exist. Further research has revealed what they do. It has been found that there are many different enzymes. Each performs one step in a series of chemical reactions that amounts ultimately to burning the food up. If one enzyme is missing, one step is missing, and the reaction stops right there. This often means trouble. In the human, there may be a disease. In fruit, a bad taste may develop. In all cases there is a change from the normal progress of things. When all the enzyme proteins have been put out of business (perhaps by heating) nothing happens. But bacteria and molds make enzymes, since all living things fabricate them for their own life processes. Thus we can destroy all the enzymes present in a fruit and still have trouble because bacteria can make more enzymes as they grow. Like everything else in biology, they make more than they need for themselves. This is why bacteria cause spoilage in foods.

Phenomenon of Decomposition

To sum it up then, enzymes are chemical substances that living cells produce to make life possible at room temperature. The phases of plant and animal life that the food man deals with consist of the growth, maturity, ripeness and finally the decay and death of his raw material. After death, more

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decay. Not very nice words, you say. From our point of view life seems to start out all right, but if there were no decay after death, all the nitrogen, phosphorous and carbon of the earth would soon be "frozen" in dead or moribund bodies. But the bacteria, molds and other small organisms decompose dead tissue into simple substances, such as ammonia and carbon dioxide, that nature uses over again to build more living tissue. "Life" is a cycle in which the world's small store of available phosphorous, nitrogen, carbon etc. is used over and over again by a series of evanescent living creatures.

Synthesis (as in growth) is one of the objectives of our enzymes. But decomposition (as in decay) is another. Growth does not specially interest the food processor. That is more the farmer's headache. But decomposition certainly interests the processor. It is enzymatic—bacterial or not. So one of the food processor's chief enemies today is some nondescript enzyme. He wants to know which one, and we enzymologists would like to tell him. But in truth there it stands. "Inactivate all the enzymes anyone ever heard of" is the best advice we can offer at present, simply because we do not know which one to pick on.

Inactivation is now done by heat, for instance by pasteurization, blanching, steaming or whatever you choose to call it. Heat, however, changes texture, flavor and consistency. If we only knew what we need to destroy by this heating, it would be simpler. There are lots of cases to be cited but they can only serve as examples, for the principle involved is not only general, it is unfortunately all too general.

Peroxidase Index

During the war, one specification for dried foods depended on the "peroxidase content," or rather on the lack of it. Did this mean that peroxidase was the bad boy among enzymes, the chap who caused all the deterioration during storage? Decidedly no. Peroxidase happens to be an enzyme that is easily tested for. It also happens to be one of the more difficult enzymes to get rid of, because it is uncommonly resistant to heat. Furthermore, after being once heated just to the point of inactivity, it is one of those substances that can sometimes pull itself together again in the cold, and thus regain its activity. Whether or not the activity of peroxidase led to anything bad, its

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presence was proof of one thing—that all the enzymes had not been permanently destroyed by the blanching process. And in foods, undestroyed enzymes are highly suspicious characters. Other heat resistant enzymes are known, but tests for them are in the main too complicated for field use.

The effect of heat on the enzymes of his raw material is thus a matter of great importance to the food processor. It must be sufficient, yet he should not overdo it. He is thus between the devil and the deep blue sea. Strangely enough, he seems very cheerful about it. He has merely dumped his dilemma in the lap of the bacteriologists and enzyme chemists, forgetting that he could help them if he would.

Processor's Opportunity

The reason the food processor could be of great help in solving his own problem is that despite all the work to date there is only one good test for the enzymes of food deterioration, and that is whether or not the food deteriorates. The processor is in a much better position to find this out than the laboratory man. If, when he found it out, he would also find out the detailed history of that product, he would soon accumulate a lot of very valuable clues. For this purpose, detailed history means the source and condition of the raw material, its degree of maturity, its heat treatment, and its subsequent storage. Until the laboratory man gets more specific tests, these are the most important data he has to work on. But reliable data of this kind are few. Perhaps their publication would be inconvenient, but even their use inside a particular organization could lead to improvements. There are lots of instances where people have profited from their mistakes, but not when they have forgotten what they did.

Perhaps there is a better way than heat to get rid of some particular enzyme. But it is the enzyme chemist's job to find that out. So far he has not found out (despite the "new ideas" which inventors incubate), and the main reason is that he still doesn't know which enzyme or group of related enzymes he is supposed to destroy. The enzyme chemist's science isn't very old, and his field is enormous—all the way from cancer to food processing. He needs fundamental knowledge that biology and chemistry haven't as yet given him. This is his alibi for only partially solving the headaches of the food in-

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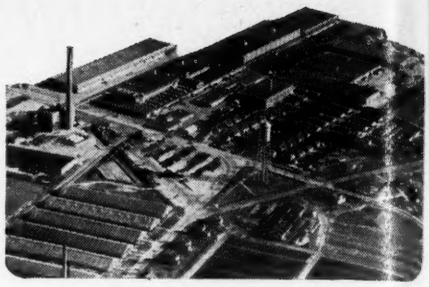

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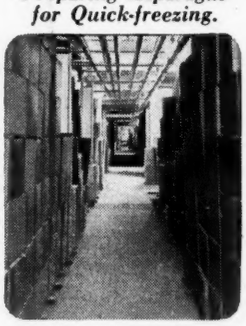

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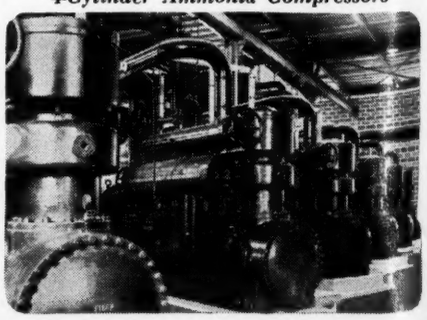

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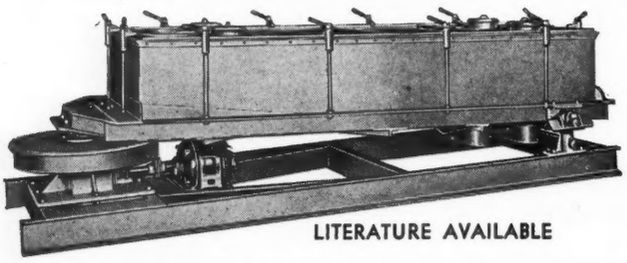

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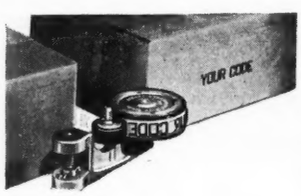

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Garrett & Co. (Wine)	State stamp info. on carton tops—also date on side.	Discharge end case sealer compression section.
Beech-Nut Packing Co. (Baby Food)	Contents identification (2 lines and code date on case side.	Belt conveyor.
Carnation Co. (Ice Cream)	Contents identification and code-mark on bulk ice cream pails.	Powered conveyor.
General Foods Corp. (Salt)	Code-date on carton side.	Case sealer compression section.
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dustries. He has laid a good foundation, however; his concept of the problem is probably correct, and his vision probably better than average. The record is not too bad for the past. But for the future—it depends on data. Some of which the processor can supply.

—End—

Canned Goods

(*Continued from page* 117)

was slight or absent and cartons remained dry. But if there was a greater gap between the temperature of the cartons and the warmer room to which they were moved, inner and outer portions of the cartons became damp after one or two days. For this to occur, it was necessary to move cartons from 15 to 60 deg. F., 31 to 70 deg. F., and 50 to 80 deg. F.

After further storage at warmer temperatures, the cartons dried out to a considerable extent. Furthermore, it was found that cartons containing labeled cans were generally damper than those containing cans without labels.

Acknowledgment

Cans were furnished by Continental Can Co., Chicago, Ill.; American Can Co., Maywood, Ill.; Minnesota Valley Canning Co., Le Sueur, Minn., and H. J. Heinz Co., Pittsburgh, Pa.

—End—

Brewery Separators

(*Continued from page* 113)

centrifugal separators if the velocity of rotation is not to suffer.

As the centrifugal separators have such low capacities and tend to retain substances responsible for chill haze, pasteurization haze and oxidation haze, there is little likelihood that they will be adopted in this country as the only means for clarification of beer. On the other hand, they will no doubt be adopted in many European countries for clarification of products that are not pasteurized and are marketed in neighboring localities.

As regards the adoption of centrifugal separators for preclarification of beer in this country, it is obvious that capacities reaching as much as 80 bbl. per hr. cannot compare with the capacities offered by filter-aid filters. It is quite apparent, however, that this equipment

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will be adopted on a large scale in European breweries owing to the fact that the filter-aids are not readily available there. It is also possible that in this country some breweries with limited production will be interested in this equipment because of its many advantages with respect to cleanliness, labor-saving and reduction of beer losses.

—End—

Plant Cleaning

(*Continued from page* 101)

solution should be washed off and out of the machinery with an excess of clean fresh water. If this is not done, corrosion may result and the detergent may impart off-flavors or colors to the food. Equipment can be, and often is, ruined by improper use of strong detergents.

Bactericides and Germicides

At least four different materials are used in canneries at the present time to attain germicidal action. They are: Chlorine compounds, quaternary ammonium compounds, strongly alkaline detergents and hot water. Of these, chlorine is probably the most widely used.

Chlorine is used in water solutions and may be added to the water in three forms: (1) As a gas through special dissolving equipment, (2) as a hypochlorite, and (3) as a chloramine. Hypochlorites and chloramines are sold in solution or powder form by detergent manufacturers under trade names, while free chlorine is sold as a compressed gas in tanks. Free chlorine and hypochlorites are rapid acting but their residuals do not persist long in the presence of organic matter. Chloramines, on the other hand, have less immediate effect but are active over a longer period of time. Gaseous chlorine is the cheapest source of chlorine, but expensive equipment is required to properly control the amount applied.

Quaternary Compounds

Quaternary ammonium compounds are complex organic chemicals and are relatively new in the field of germicidal treatment. At present they are receiving considerable attention because of certain of their properties which are different from those of chlorine. The quaternary ammonium compounds are odorless, tasteless, non-toxic, non-corrosive and stable at the pH of most water. The germicidal efficiency of these compounds is still

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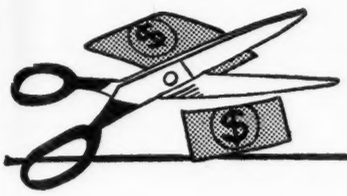

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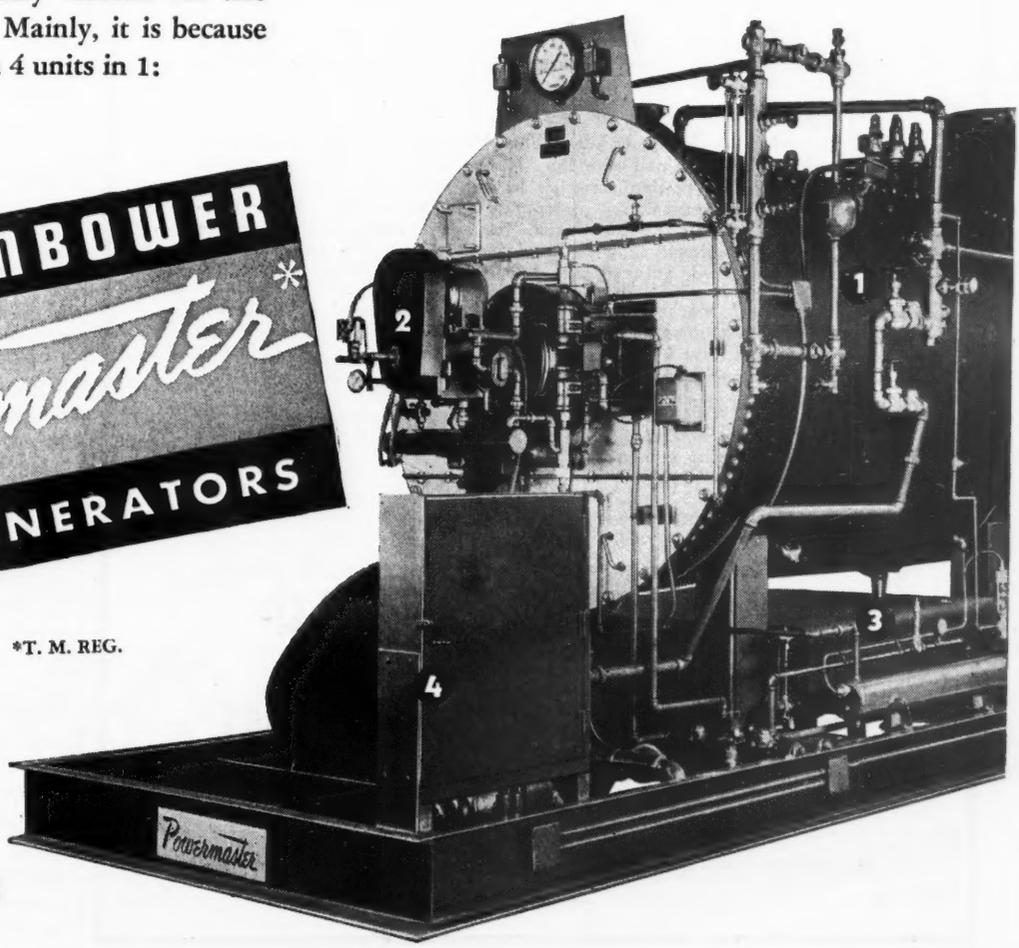

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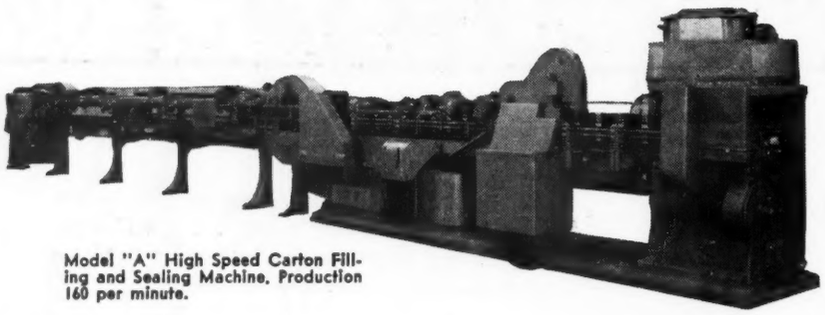
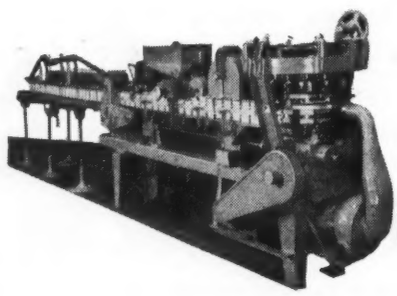


Model "A" High Speed Carton Filling and Sealing Machine. Production 160 per minute.



Model "E" Carton Filling and Sealing Machine. Production 60 per minute.

The "Neverstop" automatically feeds and seals cartons while in continuous motion, so that high speed production is obtained with slowly moving mechanisms. Volume filling is also accomplished without stopping the moving carton.

The "Neverstop" is extremely adaptable. Weighing or auger feed filling machines can be combined with the "Neverstop" when materials require their use. For free flowing materials having nearly constant volume per pound, the filling mechanism is incorporated in the machine, securing the advantages of less cost and floor space. For smaller cartons a made-up bag (liner) may be automatically fed and inserted into the carton before filling and, afterward, automatically folded and crimped or heat sealed.

The "Neverstop" Machines are furnished for either hand or automatic carton feed. An extremely tight seal is assured, top and bottom, since both are made in the same way. All carton flaps are glued, the first wide flap folded being crowded over into the fold of the second wide flap as it is folded down.

Detailed information will be furnished upon request. A sample package will help in specifying equipment.

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debated by experts. Some workers claim they are excellent, while others say they have little value. Soap, the common wetting agents, acids, alkalis, and organic matter all destroy or lessen the germicidal value of these materials. The need for completely removing all debris and cleaning agents before applying these germicides is therefore apparent.

Strong alkalis will destroy bacteria and, therefore, when they are used as detergents, bactericidal action accompanies the cleaning.

Hot water, above 170 deg. F., will destroy the vegetative forms of most bacteria and can be used as a germicide in this way. The contact time should be long enough to raise the temperature of equipment to 170 deg. F. Steam, unless used in a closed vessel under pressure, is of little value as a germicide, because blowing a blast of steam at a surface does not usually raise the temperature of that surface sufficiently to kill bacteria.

Methods of Application

Germicides such as chlorine and quaternary ammonium compounds may be applied periodically or continuously, depending on the equipment to be treated, and both methods are used extensively. Continuous application comes closer to assuring continuous bacterial cleanliness and is therefore considered most desirable where it can be used. For continuous application the germicide may be sprayed on, or belts and conveyors may be so constructed that they pass through a tank of the solution on the return side. The tank method saves on solution, and because of the high cost of quaternaries is the method most commonly used for applying these compounds. A water spray should follow the tank when applying quaternary ammonium compounds to prevent contamination of the food. The spray method is used in plants where "in-plant chlorination" is practiced. When the entire water supply is chlorinated, very satisfactory germicidal treatment is accomplished because all water used has germicidal properties.

The periodic application of a germicide usually follows the clean-up operation, and generally speaking, much higher concentrations are used for this type of application than with the continuous treatment. The germicide should only be applied after physical cleanliness is complete because all germ killing agents are hampered in their action by the presence of organic matter.

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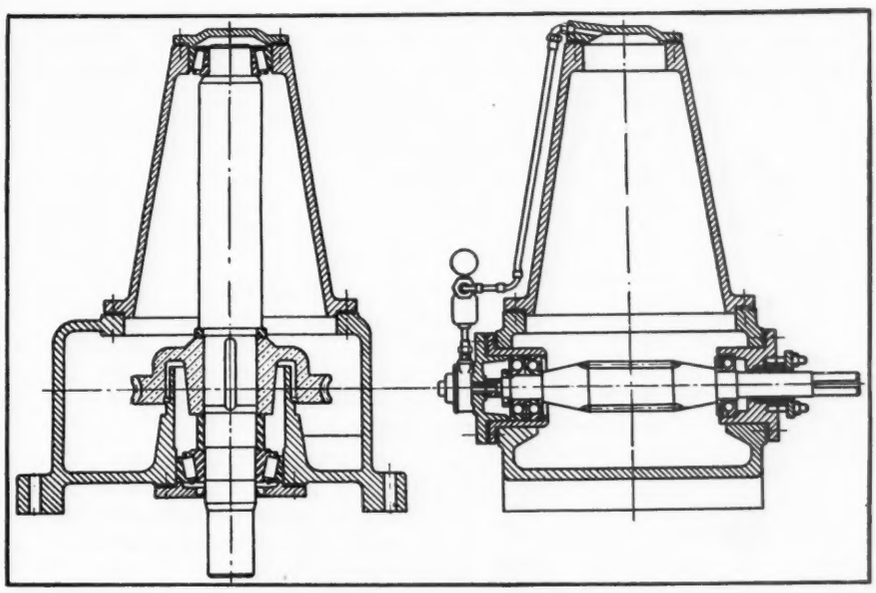

The views above illustrate cross sections through the worm and worm gear shafts.

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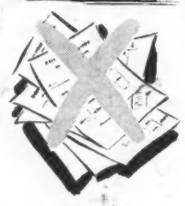

2 LOWER MAINTENANCE
Simpson Mixers are of simple design and rugged construction to provide uninterrupted service with low replacement costs for many years.

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Simpson Mixers with the bottom discharge and closely set plows, are virtually self-cleaning. Close plow setting greatly increases efficiency.

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Oyster Liquor Content

(*Continued on page* 124)

marked difference between several of the lots in the quantity of liquor released by the oysters on thrawing. The lot containing oysters which were not blown at all, yielded a low value which was approximately equal to the values for the three lots blown in weak salt solution. There was no statistically significant difference in the quantity of free liquor in the three groups blown in weak salt solution, indicating that time of blowing in salt solution has little, if any, effect on the quantity of free liquor released.

The length of blowing time did have an effect on the quantity of free liquor released on thawing of those lots of oysters blown in water. In lots that were blown 15 and 30 minutes, the quantity of free liquor was higher by about four percent than in the lot that had been blown for only three minutes. While blowing the different lots of oysters, it was noticed that there was only a slight increase in volume of the oysters blown in salt solution. On the other hand, oysters blown in fresh water increased considerably in volume. No accurate measurements of comparative volumes were made at the time.

Within any one group of oysters, variations in the amount of free liquor from month to month were marked. There was no tendency for the amount of free liquor to increase or decrease during storage.

Oysters that were slowly thawed during the eighth and ninth months' tests yielded about half as much free liquor as those that were rapidly thawed. The relationship of the percentage of free liquor between groups remained approximately the same.

Palatability Scores

As in the pH value determinations, there was no consistent change in palatability scores within the various lots during storage. The oysters of all lots were rated about equal in quality at the end of the 12 months' storage.

The individual palatability scores of the various lots for the twelfth month ranged from 9.1 to 9.6. The average score of each of the lots during the entire 12 months ranged from 9.1 to 9.4. Since a score of 9 or over is considered "very good," the quality of the frozen oysters remained at a relatively high level during storage.

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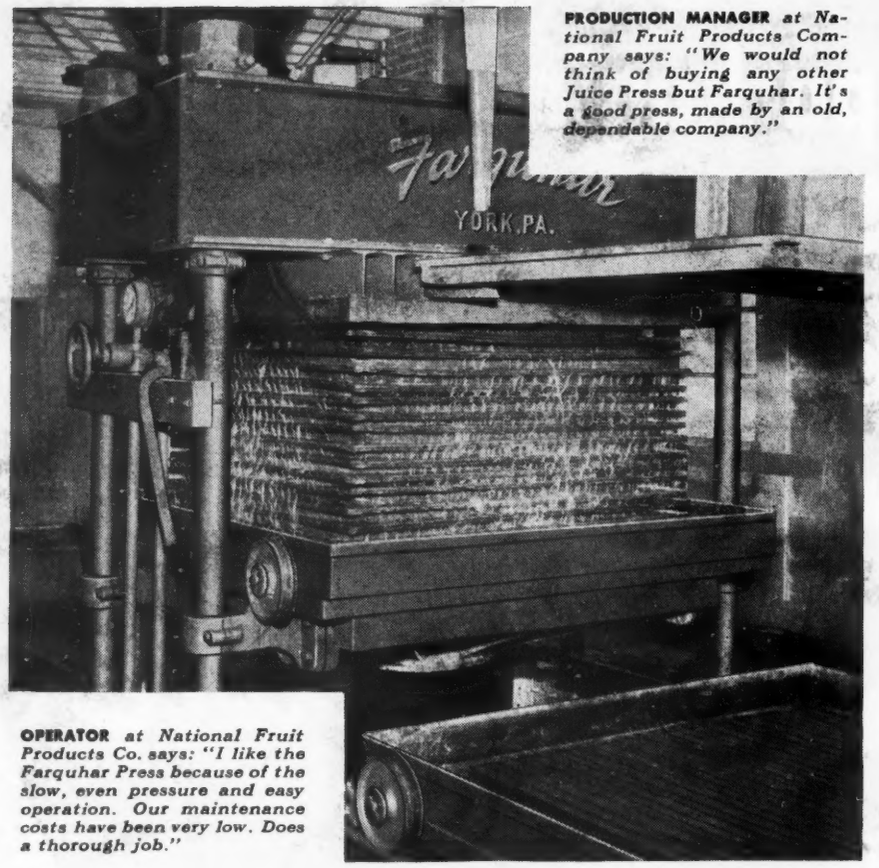
quality, it apparently makes no difference whether freshly shucked oysters are blown in water, sprayed with water, or blown in a weak salt solution before they are frozen. Judged on the basis of palatability and pH value changes, the different lots of oysters were of equal quality when stored for one year, and showed no marked deterioration.

Within any one lot of frozen oysters, there apparently was no correlation between length of storage and the quantity of free liquor released on thawing. There was a marked difference, however, in the quantity of free liquor released by oysters given different prepackaging treatments. The smallest amounts of free liquor were obtained from those oysters which received no prepackaging treatment prior to freezing other than spraying with water or blowing in weak salt solution. Blowing in fresh water produced increased amounts of free liquor on thawing, particularly for the longer periods of blowing.

References

1. S. R. Pottinger, R. G. Kerr and W. B. Lanham, Testing Packaging Materials for Quick Frozen Oysters, *Food Industries*, 19 : 100-102 and 220-222, 1947.

—End—



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